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TRANSACTIONS

OF THE

LINNEAN SOCIETY.

VOL. V.

TRANSACTIONS

OF THE

LINNEAN SOCIETY.

VOLUME V.

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TRANS-

TRANSACTIONS

OF THE

LINNEAN SOCIETY.

I. *Descriptions of some minute British Shells. By the late John Adams, Esq. F. L. S.*

Read February 6, 1798.

I BEG to lay before the Linnean Society the specific characters, with additional observations and drawings, of some minute Shells, which have fallen under my observation since my last paper on this subject.

Pembroke, Jan. 14, 1798.

BULLA.

truncata. 1. B. testâ subovali apice truncatâ.

Tab. I. *fig.* 1, 2.

Sand at the Wash, rare.

Obs. Colour white, opaque.

denticulata. 2. B. testâ oblongâ subæquali obtusâ lævi, aperturâ ad apicem denticulâ acutissimâ.

Tab. I. *fig.* 3, 4, 5.

Sand

Sand at the Wash, not common.

Obs. Shell pellucid, white.

punctata. 3. B. testâ oblongâ subæquali transversè punctatâ.
TAB. I. *fig.* 6, 7, 8.

South Sands at Tenbigh, very rare.

Obs. Shell pellucid, with distant longitudinal striæ.

emarginata. 4. B. testâ gibbâ, aperturâ emarginatâ.
TAB. I. *fig.* 9, 10, 11.

Obs. Shell pellucid, smooth; lip subarcuated. B. *emarginata*, *punctata*, and *denticulata*, agree in their general habit; and *truncata* is most nearly allied to *cylindrica*.

TURBO.

trifasciatus. 1. T. testâ lævi quinque anfractibus subobsoletis fasciatis, aperturâ ovali.
TAB. I. *fig.* 12, 13.

Sand at the Wash.

Obs. Shell pellucid, imperforated, whitish, with two transverse red bands on the first spire, and one on the second.

membranaceus. 2. T. testâ lævi quinque anfractibus obliquè fasciatis, aperturâ subovali.
TAB. I. *fig.* 14, 15.

Sand at the Wash.

Obs. Colour yellowish brown, thin, pellucid, with oblique

oblique yellow-brown ſtripes, imperforated; readily diſtinguiſhed by its membranaceous appearance.

interruptus. 3. T. teſtâ lævi quinque anfractibus ſubobtuſis, aperturâ ſubrotundâ.

TAB. I. *fig.* 16, 17.

Sand at the Waſh.

Obſ. Shell gloſſy, pellucid, white, imperforated; ſpires with interrupted longitudinal bands of a rich ochreous colour.

ſubrufus. 4. T. teſtâ lævi quinque anfractibus ſupernè ſubangulatis.

TAB. I. *fig.* 18, 19.

Lenny Bay.

Obſ. Shell opaque; colour dull red; upper part of each ſpire marked with a white tranſverſe band.

HELIX.

faſciata. 1. H. teſtâ lævi tribus anfractibus, primo ventricoſiore, ſubumbilicatâ, aperturâ ampliatâ.

TAB. I. *fig.* 20, 21.

Sand at the Waſh. Tenbigh.

Obſ. This delicate ſpecies is pellucid, white; firſt ſpire marked with three tranſverſe belts of a rich marone colour, the middle one broad, the lateral ones narrow.

nitidissima. 2. H. testâ duobus anfractibus, subtilissimè transversè striatâ.

TAB. I. *fig.* 22, 23, 24.

Obs. Corneous, pellucid, umbilicated; easily distinguished by the uncommon brilliancy of its glossiness.

bicolor. 3. H. testâ lævi duobus anfractibus, vix umbilicatâ.

TAB. I. *fig.* 25, 26, 27.

Tenbigh.

Obs. This species differs from the preceding, to which it is nearly allied in other respects, in being perfectly smooth, devoid entirely of any glossiness, and in having the inside of the shell white.

SERPULA.

ovalis. 1. S. testâ subovali imperforatâ.

TAB. I. *fig.* 28, 29, 30.

Tenbigh, common.

Obs. This species agrees nearly with *fig.* 1. *pl.* 1. *Walker's Minute Shells*, but differs evidently in never being perforated.

reflexa. 2. S. testâ regulari rotundâ, *aperturæ margini reflexâ.*

TAB. I. *fig.* 31, 32.

Sand at the Wash.

Obs. Glossy, white, perforated; aperture above the plane of the spire.

cornea.

cornea. 3. S. teſtâ regulari rotundâ pellucidâ, tribus anfractibus.

Tab. I. *fig.* 33, 34, 35.

Sand at the Waſh.

Obſ. Browniſh horn-colour.

EXPLANATION OF TAB. I.

Fig. 1. Bulla truncata, magnified.
2. ————————, natural ſize.
3. Bulla denticulata, upper ſide magnified.
4. ————————, natural ſize.
5. ————————, under ſide magnified.
6. Bulla punctata, upper ſide magnified.
7. ————————, natural ſize.
8. ————————, under ſide magnified.
9. Bulla emarginata, upper ſide magnified.
10. ————————, natural ſize.
11. ————————, under ſide magnified.
12. Turbo trifaſciatus, magnified.
13. ————————, natural ſize.
14. Turbo membranaceus, magnified.
15. ————————, natural ſize.
16. Turbo interruptus, magnified.
17. ————————, natural ſize.
18. Turbo ſubrufus, magnified.
19. ————————, natural ſize.
20. Helix faſciata, magnified.
21. ————————, natural ſize.

Fig. 22. Helix nitidiſſima, upper ſide magnified.
23. ————————, natural ſize.
24. ————————, under ſide magnified.
25. Helix bicolor, upper ſide magnified.
26. ————————, natural ſize.
27. ————————, under ſide magnified.
28. Serpula ovalis, upper ſide magnified.
29. ————————, natural ſize.
30. ————————, under ſide magnified.
31. Serpula reflexa, magnified.
32. ————————, natural ſize.
33. Serpula cornea, upper ſide magnified.
34. ————————, natural ſize.
35. ————————, under ſide magnified.

II. *De-*

Linn. Trans. V. tab. 1. p. 6.

II. *Descriptions of some Marine Animals found on the Coast of Wales. By the late John Adams, Esq. F. L. S.*

Read February 6, 1798.

PHALANGIUM.

1. *grossipes.* P. CORPORE minuto cylindrico, humeris tuberculato, pedibus longissimis. *Linn. Syst. Nat. Ed.* 13. *p.* 1027.

Milford Haven.

Obs. To the minute and accurate description given in the *Systema Naturæ* I can have nothing to add, except that its colour is a dirty red.

2. *hirsutum.* P. corpore subplano decemangulo.

Tab. II. *fig.* 1, 2.

Milford Haven. Tenbigh.

Obs. Body oval with ten angles, and marked with a transverse band near the centre; antennæ serrated on the interior side; feet eight, hairy; tail cylindrical, obtuse; colour palish brown; length $\frac{1}{3}$ inch.

ONISCUS.

1. *bidentatus*. O. abdomine nudo, caudâ obtusissimâ, squamâ ultimâ bidentatâ.

TAB. II. *fig.* 3, 4.

Milford Haven.

Obs. Length ½ inch; upper side marked with six transverse rows of ochreous spots; scales seven, the last with two teeth, which readily distinguishes this species.

NEREIS.

1. *viridis*. N. viridis filiformis segmentis CXXX. *Linn. Syst. Nat. Ed.* 13. *p.* 1086.

Amongst young plants of the *Fucus pinnatifidus* at Tenbigh.

Obs. Length 2¼ inches.

ACTINIA.

1. *maculata*. A. coralliflora, tentaculis numerosissimis retractilibus brevibus albis.

Milford Haven, surrounding the apertures of deserted shells of the *Murex despectus*.

Obs. This beautiful species is longitudinally sulcated, having the edges of the base crenated: the lower part is an obscure red, and the upper part is transparent white marked with fine purple spots; the outer circumference of the aperture has a narrow stripe of pink. When expanded, the superior divi-

ſion of the body ſeems formed of fleſhy bars placed in a reticulated manner, and lined with a fine membrane. From perforated warts, placed without order on the outer coat, iſſued white filamentoſe ſubſtances variouſly twiſted together: I have obſerved a ſimilar body ejected from the mouths of all the ſpecies of this genus, which have fallen within my notice.

2. *ſenilis.* A. ſubcylindrica tranſverſè rugoſa. *Linn. Syſt. Nat. Ed.* 13. *p.* 1088. *Baſter. ſubſ. t.* 13. *f.* 2. bonà.
Rocks, Tenbigh.

Obſ. The ſpecimens I obſerved were ſmaller than as repreſented in the figure above quoted; but that remarkable ſoft hairy appearance ariſing from the ſlender form and number of the tentacula, which ſo readily diſtinguiſh it from its Britiſh congeners, is well pourtrayed. Colour white or pink; when at reſt, the exterior coat is ſmooth.

ASTERIAS.

1. *minuta.* A. corpore rotundo, radiis quinque tenuiſſimis hirſutis. *Penn. Br. Zool. v.* 4. *p.* 63. n. 61.
Tenbigh, rare.

Obſ. Body round, convex, brown, ſomewhat larger than the head of a common pin; rays hirſute, about three times the diameter of the body, white. When examined under a microſcope, the upper ſide appears marked with a tawny yellow ſpot in the form of a

 pentagon,

pentagon, and the under side with a small yellow cinquefoil. The body contains a yellowish juice. Rays jointed, and from either side of each joint proceed three oval pellucid pointed bodies, which cause its hirsute appearance.

2. *rubens.* A. stellata, radiis lanceolatis gibbis, undique aculeata. *Linn. Syst. Nat. Ed.* 13. *p.* 1099. *Baster. subs. t.* 12. *f.* 1—6.

Not unfrequent in Milford Haven.

Obs. Colour pale orange; diameter 14 inches.

3. *pectinata?* A. radiata, radiis duplicatis; superioribus pinnatis, inferioribus filiformibus. *Linn. Syst. Nat. p.* 1101.

A. decacnemos. *Pen. Br. Zool. v.* 4. *p.* 66. *t.* 33. *f.* 71. bona.

In Milford Haven, very common.

Obs. Both the pinnated and simple rays in this singular species are closely jointed throughout, and from these articulations arises its flexibility. The pinnæ on the under side are furnished with hollow tubes, gradually decreasing in size as they approach the end; from which proceed, at the will of the animal, small filiform, transparent, flexible bodies, which are probably the organs of feeling: On separating one of the pinnæ from the main stem, the flesh was found to be composed entirely of small opaque globes. The filiform rays (or perhaps more properly the *radicles*, since by them the animal attaches itself to any thing) are each terminated by an incurvated claw, resembling in figure and evidently for the same purpose as the claws of birds. The body

body is covered on the upper ſide by five unequal valves. It is remarkable of this ſpecies, that it is furniſhed with *two* apertures, one at the confluence of the valves, the other in the largeſt valve; their poſition with reſpect to the centre is variable: the laſt may readily eſcape obſervation, except when the animal chooſes to elevate it above the plane of the valve. When fully expanded, the inſide appears clothed with a fine membrane longitudinally folded and revolute at its margin. Colour deep red.

Since the illuſtrious Mr. Pennant has not referred his A. *decacnemos* to the A. *pectinata* Linn. (though he has quoted Barrelier and the figure of Linckius, which are given by Linnæus as ſynonyms to his A. *pectinata)*, I cannot but feel apprehenſive of having committed an error in conſidering them as the ſame ſpecies, and have conſequently affixed a mark of doubt to the Linnean reference; but ſince the ſpecific character given in the *Syſtema Naturæ* accords perfectly with numberleſs ſpecimens which I have examined, I truſt it will not be the cauſe of any confuſion to a Britiſh naturaliſt.

SERTULARIA.

1. *imbricata.* S. ſubramoſa, veſiculis ſubclavatis, ſursùm inordinatè imbricatis.

Tab. II. *fig.* 5—11.

On the *Fucus nodoſus.* Milford Haven.

Obſ. This ſpecies ſeems moſt nearly allied to the S. *ce-*

drina. Linn. Syst. Nat. Ed. 13. *p.* 1313. n. 28. *Pallas. Zooph. p.* 139. from which however it differs in the vesicles not surrounding the stem in any regular series, and in their shape. Height, from one to three inches. Young shoots closely imbricated to their base, but older ones often naked: the smaller branches, which proceed from a main stem, have the vesicles placed bifariously, but at their apex they resume the imbricated form.

TUBULARIA.

1. *flabelliformis.* T. tubulis parallelis fasciculatis; fasciculis radiatim dispositis.

Tab. II. *fig.* 12, 13, 14.

On the *Conferva rubra.* Milford Haven.

Obs. This minute coralline differs considerably from its British congeners in habit, but agrees with them in texture. Its origin is a simple cylindrical stem, affixed at its base, which is a little dilated to the stems of the Conferva: it soon, however, loses this form, and very abruptly becomes dilated into a fan-shaped compressed body, from which proceed eight rays. These rays, when examined under the first magnifier of Ellis's microscope, appear composed of equal and perfectly cylindrical tubes. In some I observed a deep crimson spot, which was probably a dead or torpid polype.

EXPLA-

fig 3
fig 1
4
2
8
7
6
5
11
10
9
13
14
12

EXPLANATION OF TAB. II.

Fig. 1. Phalangium hirſutum, magnified.
2. ———————, natural ſize.
3. Oniſcus bidentatus, magnified.
4. ———————, natural ſize.
5. Sertularia imbricata, natural ſize.
6. ———————, a branch, magnified.
7. ———————, a young branch, magnified.
8. ———————, a ſhoot from the baſe, magnified.
9. ———————, the ſtalk without the veſicles, magnified.
10. ———————, a young cell.
11. ———————, a polype in its cell.
12. Tubularia flabelliformis, natural ſize.
13. ———————, magnified.
14. ———————, tubes which compoſe the rays, magnified.

III. *Obſer-*

III. *Obſervations on the Economical Uſe of the Ranunculus aquatilis: with Introductory Remarks on the acrimonious and poiſonous Quality of ſome of the Engliſh Species of that Genus.* By Richard Pulteney, M. D. F. R. S. and L. S.

Read May 1, 1798.

BOTH antient and modern writers on Botany, and the *Materia Medica*, agree, pretty uniformly, in attributing to many ſpecies of the genus *Ranunculus* a corroſive and poiſonous quality. In ſeveral it abounds in ſuch a degree as, when applied externally, in a recent ſtate, to excite veſications, and ulceration of the parts, frequently of a malignant and gangrenous nature: and, when taken inwardly, to prove poiſonous and fatal, by inducing vomiting, inflammation of the ſtomach, with the uſual conſequences of *acrid* poiſons. Theſe qualities are particularly manifeſt in the recent plant, while in its higheſt vigour before flowering; and more intenſely in the germen of the flower itſelf, and in the petals of ſome.

The poiſonous ſpecies, that are indigenous, and common in England, are, the *Ranunculus Flammula*, or Leſſer Spearwort; *R. bulboſus*, bulbous rooted Crowfoot; *R. acris*, upright Crowfoot; *R. ſceleratus*, Marſh Crowfoot; *R. arvenſis*, Corn Crowfoot; and the *R. aquatilis*, or Water Crowfoot, according to the report of various authors. Of theſe the *Flammula, bulboſus*, and *ſceleratus*, are judged to be the moſt acrimonious.

Before

Before the introduction of *Cantharides*, the acrid *Ranunculi* were, all in their turn, used as vesicatories; and Haller tells us *, the *R. Flammula* is still in use as such in some parts of France. Gilibert assures us †, that the *R. bulbosus* vesicates with less pain than the *Flies*, and has no effect on the urinary passages. He gives it therefore a decided preference as an epispastic. Other authors allow these qualities in the *Ranunculi*, and that they are quicker than *Cantharides* in their vesicating effect; but say, that all these advantages are more than balanced, by the greater uncertainty of their action on the skin, and their frequently leaving ill-conditioned ulcers, of which Murray and other writers have recorded instances ‡. Nevertheless, the *Ranunculi* were employed in local spasmodic complaints and in fixed pains, and not unfrequently in cataplasms to the wrists in intermitting fevers. *Crowfoot* is known also to have been one of the ingredients in Plunket's Epithem for Cancers.

The acrimony of these plants is, however, of so volatile a nature, that, even in the most virulent, it is wholly dissipated in drying; so that, in the form of hay, they appear to be harmless, and nutritive to cattle. It is also instantly expelled in decoction, probably in all the species; at least, Murray informs us, that the shepherds of Morlachia eat even the *R. sceleratus*, as a culinary plant, after boiling it: the *R. auricomus*, and, as several authors assure us, the *R. repens*, are so destitute of acrimony as to be wholly inoffensive, and even worthy of a place among oleraceous plants.

* See the *Enumeratio Stirpium* and *Historia Stirpium Helvetiæ*, in which much satisfactory information is collected, respecting the properties of this genus of plants; and for which the Author has, with his usual candour and accuracy, quoted all his authorities.

† *Plantæ rariores Lithuaniæ*, No. 331.

‡ *Apparat. Medicam.* iii. 87.

The

The *Ranunculi* give out this quality wholly in diſtillation: the water of the *R. ſceleratus*, by the experiments of Tilebein, as recorded in the ſecond volume of the *Chemical Annals*, is acrimonious in an intenſe degree, and, when cold, depoſits cryſtals which are ſcarcely ſoluble in any menſtruum, and are of an inflammable nature*. The diſtilled water of the *R. Flammula*, or Leſſer Spearwort, as we are informed by Dr. Withering, is an emetic more inſtantaneous, and leſs offenſive during its action, than white vitriol; and, as if Nature had furniſhed an antidote to poiſon from among poiſons of its own tribe, is to be preferred in promoting the inſtant expulſion of deleterious ſubſtances from the ſtomach.

In the experiments of the *Pan Suecus*, even in the improved edition by Schreber, after the obſervations and renewed trials of Kalm, Gadd, Bergius, and Laſtbohm, made upon horned cattle, goats, ſheep, horſes and ſwine, all the ſpecies of *Ranunculi*, with which trials were made, except the *R. auricomus*, were rejected by the horned cattle; and it is well known, that while our meadows and paſtures are eaten bare of other vegetables, the *R. acris*, and *R. bulboſus*, which are but too plentiful, are left untouched: neither do cattle willingly eat the *R. repens*, although it is not wholly rejected by horſes, ſheep, and goats.

The *R. Flammula*, according to the above experiments, was eaten only by horſes, to which animal it is there ſaid to be very grateful; whereas the *R. auricomus*, eaten by all the reſt, (except that ſwine chooſe only the roots,) was rejected by horſes. The *R. ſceleratus*, which is ſuppoſed to be the *Herba Sardonia* of Dioſcorides, was touched by goats alone; the *R. bulboſus* only by the latter, though it is well known in England that hogs are fond of the roots. The *R. acris* was eaten by ſheep and goats; but the *R. aquatilis* is recorded as the only one re-

* Page 313.

jected by all the five species of animals, on which these trials were made. It does not appear by either edition of the *Pan Suecus*, that any trials were made with *R. arvensis*; and though horned cattle and horses will eat this species greedily, (although not without subsequent injury,) yet it is known to have been highly deleterious to sheep. A notable instance of this occurred in Piedmont, in the year 1786, where a number of these animals died, as it was at first supposed, of an epidemical disease; but subsequent examination discovered, that this destruction was owing to the *Ranunculus arvensis*. The history of this accident is circumstantially related in the Memoirs of the Royal Academy of Turin, by M. Brugnon*. The herb grows luxuriantly in Piedmont, and the sheep fed with much eagerness upon it. The effects here mentioned were not immediate, but progressive; and M. Brugnon, on further investigation, was convinced they were principally owing to the roots of the plant; since by experiments purposely made on dogs, these animals were almost instantly killed by them. On the dissection of the sheep, all the four concoctive organs were found affected with erysipelatous and gangrenous spots; but more particularly the *abomasum*, which he found much more deeply ulcerated than the others; and the mischief had extended into the smaller intestines.

The avidity with which sheep, horses, and cows, eat the *Ranunculus arvensis*, is, as M. Brugnon justly observes, an exception to the commonly received maxim, that herbivorous animals are, by instinct, led to reject whatever is noxious. We see frequently, that hunger will impel our domesticated cattle, especially on being first turned to grass in the Spring, to eat almost all vegetables promiscuously:

* Memoires de L'Académie Royale des Sciences. Années 1788—1789, à Turin. 4to. 1790.

 Some

Some of our farmers are aware of the effects of *Crowfoot*, of which the *R. acris* and *R. bulboſus* are ſo common in our paſtures, and by which the mouths of their cattle are frequently inflamed and bliſtered; and doubtleſs the effects often extend much farther, and ſometimes prove fatal. There can be little doubt of the ſame deſtructive conſequences from other poiſonous plants, in caſes where the cauſe is little ſuſpected.

M. Krapf, who inſtituted a ſet of experiments wholly confined to this genus of plants*, attributes to the *R. aquatilis*, the deleterious qualities belonging to the others; obſerving, that it will veſicate the ſkin, but is ſlower in its operation than the *R. bulboſus* and *R. ſceleratus*. Biſhop Gunnerus alſo, in his *Flora Norvegica* †, tells us, that this ſpecies is not leſs noxious to cattle than the *R. ſceleratus*; that even the goat, an animal leſs nice in the ſelection of its food than the others, leaves it wholly untouched.

It is well known to botaniſts, that the *Ranunculus aquatilis* of Linnæus comprehends four ſpecies of the older writers; and even Haller, and ſome more modern authors, ſtill keep them ſeparate: among whom, the late Profeſſor Sibthorp, in his *Flora Oxonienſis*, enumerates them diſtinctly, under the names of 1. *R. heterophyllus*, or *R. aquatilis Ger. em.* 829. *Ray Syn.* 249. 2. *R. aquatilis*, or R. aquatilis omnino tenuifolius *J. B.* iii. 781. *Ray Syn.* 249. 3. *R. circinatus*, R. aquaticus albus, circinatis tenuiſſime diviſis foliis, floribus ex alis longis pediculis innixis *Pluk. alm.* 311. *t.* 55. 2. *Ray Syn.* 249. and 4. *R. fluviatilis*, or Ranunculo ſive Polyanthemo aquatili albo affine, Millefolium maratriphyllum fluitans. *J. B.* iii. 782. Without en-

* *C. Krapf*, Experimenta de nonnullorum Ranunculorum venenatâ qualitate, horum externo et interno uſu. *Viennæ*, 1766. 8vo. p. 107.

† No. 646.

tering here into any diſquiſition relative to theſe diſtinctions of the ſpecies, I ſhall come to the ultimate object of theſe obſervations, by remarking, that I was lately witneſs to a fact, with reſpect to the *Ranunculus aquatilis fluviatilis*, which, after what I recollected of the character of the plant, ſomewhat ſurprized me, while it ſufficiently proved, not merely the innoxious quality of this plant, but that it is nutritive to cattle, and capable of being converted to uſeful purpoſes in agricultural economy. Unleſs theſe varieties of the *R. aquatilis* Linn. be endowed with different properties, it is a proof that the experiments on this plant were not made with ſufficient accuracy, or diſcrimination of the varieties; not ſufficiently repeated on different individuals of the ſame ſpecies of animals; or, that in different countries or ſituations it is diveſted of its virulence. In the preſent inſtance, it is probable, the plant is rendered inert as a poiſon, by growing in the water; although in certain other inſtances, moiſture is thought to heighten the deleterious property of vegetables, eſpecially in the umbelliferous tribe.

The fact that I have alluded to is, that in the neighbourhood of Ringwood, on the borders of the Avon, which affords this vegetable in great abundance all the year, ſome of the cottagers ſuſtain their cows, and even horſes, almoſt wholly by this plant; ſince the remaining part of their food is nothing more than a ſcanty pittance they get on the adjacent heath, which affords little more than *Ling*, *Lichen*, Bog-moſs or *Sphagnum*, &c. It is uſual to employ a man to collect a quantity for the day every morning, and bring it in the boat to the edge of the water, from which the cows, in the inſtance I ſaw, ſtood eating it with great avidity. I was indeed informed they reliſhed it ſo highly, that it was unſafe to allow them more than a certain quantity; I think between twenty-five and thirty pounds each, daily; but with variation according to circumſtances.

 The

The cows I ſaw were apparently not in a mean condition, and gave a ſufficient quantity of good milk. I was told by the perſon whoſe cattle were feeding on it, that he kept five cows and one horſe ſo entirely by this plant, and what the heath afforded, that they had not conſumed more than half a ton of hay throughout the whole year; none being uſed, except when the river is frozen over. I examined the whole parcel, on which four cows were feeding, in the beginning of March; and found the whole conſiſted, excluſively, of the *Ranunculus fluviatilis*, without any mixture of the *Potamogeton, Carex, Sparganium*, or other aquatic plants. In Summer, however, it can ſcarcely be avoided but that there muſt be a mixture of ſome of theſe: but other plants are not choſen.

This account was confirmed to me by different perſons; by whom I was further informed, that hogs are alſo fed with the ſame plant, on which they improve ſo well, that it is not neceſſary to allow them other ſuſtenance, till it is proper to put them up to fatten.

This relation, while it ſhews how carefully experiments ſhould be conducted before a deciſive judgment on the powers of any reputedly poiſonous vegetable can be formed, may induce ſuch as were unacquainted with this fact, to adopt the uſe of this plant in ſimilar ſituations, ſince it is one of the moſt frequent in many rivers of this kingdom. The application of it to theſe uſeful purpoſes will alſo anſwer a ſecondary good, of tending to clear the ſtreams of what is otherwiſe conſidered as a noxious weed; ſince, by its abundance in Summer, it is frequently ſeen to choke up the rivers more than any other plant, and, from ſlight falls of rain, contributes much to the overflowing of meadows in hay-time.

IV. *Obſervations on preſerving Specimens of Plants.* By *John Stackhouſe, Eſq.* F. L. S.

Read October 2, 1798.

IN proſecuting my reſearches with a view to complete the hiſtory of the Britiſh *Fuci*, I was deſirous to diſcover, if poſſible, a method of preventing the olive-coloured, coriaceous ſpecies from turning black in drying. For this purpoſe I tried the experiment of immerſing them in a ſtrong ſolution of alum. The reſult of my experiment did not anſwer my expectation. They were prevented indeed from turning black, but they acquired a greeniſh hue. However, imagining this might ariſe from the mixture of aluminous with muriatic ſalts, and being of opinion that the properties of alum might be of great uſe in preſerving land plants on ſeveral accounts, I ſet on foot a courſe of experiments, and am happy to ſay that the reſult has been favourable to my expectations. After repeated trials, during which partial failures occurred, owing to the proportioning the degrees of ſtrength of the ſolution, and the admiſſion of light and air during the time of drying, I can ſafely recommend to the public attention the proceſs which follows, not doubting but that many improvements will ſuggeſt themſelves to thoſe who poſſeſs a chemical knowledge of the various ſubſtances made uſe of by dyers in fixing their colours.

Take a ſaturated ſolution of powdered alum in common water: immerſe carefully your ſpecimen, flowers, leaves and ſtalk, in this liquor.

liquor. During this immerſion, with a camel's-hair bruſh, ſuch as varniſhers make uſe of, wet thoroughly a ſheet of blotting-paper: diſplay your ſpecimen carefully on this paper, and prepare another ſheet in a ſimilar manner to lay over your plant. Then give a ſmart preſſure to your plant, either with a botanical preſs, a napkin preſs, or weights of any kind applied to the ſpecimen placed between ſmooth boards, or books, obſerving to lay about half a quire of paper below the ſpecimen, and the ſame quantity above, to take up the moiſture. After a day or two, according to the ſucculency of the plant, and when the aluminated paper appears perfectly dry, your ſpecimen may be removed into freſh paper, and kept carefully under gentle preſſure, with the edges of the paper folded over each other to prevent every poſſible admiſſion of light and air, till its removal into the herbarium. For thoſe who wiſh to affix their ſpecimens (and it is ſcarcely poſſible to effect the preſervation of the delicate tints of the petals of many kinds without a ſtrong adheſion to, and almoſt incorporation with the paper), the time abovementioned, that is, when the aluminated paper is thoroughly dry, is the proper time for proceeding with the operation. Have ready a paſte made with flour and water, with alum mixed in it, ſuch as upholſterers uſe, ſtrong gum-water, or iſinglaſs-glue: apply either of theſe to the back of your ſpecimen with a bruſh; then fix it carefully on ſtrong writing or drawing paper, by laying your paper ſmoothly on the ſpecimen as it lies, preſſing it gently with your hands and a cloth, and then turning over both together. When this is done, iron the plant with a box-heater in the manner recommended by Major Velley in Dr. Withering's *Arrangement of Britiſh Plants*, *v.* 1. *p.* 34. if you have the conveniencies; if not, apply an immediate and ſmart preſſure, as before directed.

It is taken for granted that thoſe who wiſh to profit by theſe

inſtructions,

inftructions, are practifed in the ufual methods of preferving dry fpecimens, and that they are aware that particular care fhould be taken to pare off the back parts of thick woody ftalks, and of the globofe, fucculent heads of flowers, as well as of the buds of thofe intended to be pafted down, previous to their preffure. For the moft fatisfactory information on thefe particulars, the reader is referred to the Introduction to Dr. Withering's excellent work abovementioned. It is almoft needlefs to mention, that aluminated fpecimens will be completely guarded from the erofion of infects, as well as from the danger of being injured by damps; and therefore the procefs will be particularly valuable to thofe who vifit foreign countries.

As beauty and durability are of fo much confequence in the arrangement of an herbarium, and as plants cannot be preferved any length of time in perfection even with the ufual apparatus of a *vafculum*, or tin-cafe, no botanical traveller fhould be without a fmall prefs, fuch as that defcribed in Dr. Withering's *Arrangement*, *v.* 1. *p.* 31. It may be framed fo as to admit of a drawer for receiving the preferved fpecimens; either thin enough to lie under the feet in a poft-chaife; or, as a feat for a third perfon is often defirable, it may be contrived to be as high as the feat of the carriage, with a correfponding cufhion on the top.

V. *On*

V. *On the Ascarides discovered in the Pelecanus Carbo and P. cristatus. By Richard Pulteney, M. D. F. R. S. and L. S.*

Read November 6, 1798.

THE liberty I now take of troubling the Society, with what may appear to many a trifling object, is, however, one among many other proofs of the utility of its institution; as affording a repository, or centre of communication, always open for the reception of detached tracts in Natural History; which, if deemed of small importance in such instances as the present, is more than balanced by the utility of others that might be entirely buried in oblivion, for want of a ready and convenient mode of introduction to the public, without the obligation of writing a formal dissertation which perhaps neither time, nor want of proper aid by access to books, may allow.—In that situation I now wish to be regarded, and indulged, by this Society.

Having lately heard a gentleman, remarkable for his skill as a sportsman, and not less curious in his observations, relate that he had more than once, on opening the crop of the Corvorant (*Pelecanus Carbo*, Linn.), found a large quantity of worms in it, I engaged him to send me a few. He informed me, that they lay coiled together into a ball or congeries (as I believe is usually the case) of a large size, in some equal to that of an egg. It was not, however, from the *Corvorant* only, but from the *Shag* also, that these worms were taken. They were promiscuously put into a phial, and do not

 appear

appear to differ. In the recent state they were of a brownish-yellow cast, having lost much of the colour since they were put into the brandy and water. This gentleman, and the party with him, killed at the time upwards of twenty of these birds, in every one of which worms of this kind were found; and, what appears worthy of attention, is, that they were discovered, together with small pebbles, and fragments of wood, in the crops of *young Shags*, that had never been out of the nest.

A few of these animals will be presented to the Society with this paper, and I think it will appear that they are all of the kind called *Ascarides*, the species of which, or at least the different species of animals in which the same is found, have been discovered, of late years, to be greatly more numerous than was formerly known; observations relating to worms in the intestines of animals having been almost wholly confined to those found in the human species.

Linnæus describes only two *Ascarides*, for the characters of which I need only refer to the *Systema Naturæ*. It is to the discoveries of later authors that we owe the knowledge of a much greater number, and find them now inhabiting a great variety of subjects throughout the different classes of the animal kingdom. It is well known that Redi was the first writer who augmented the knowledge left us by the Antients, or who extended enquiries on the subject of *Animalcula* which infest the bodies of living animals. He mentions the *Ascarides* of the Eagle, the Raven, the Swan, the Crane, and of several others*. After his time, scattered observations only were recorded, and many years intervened before any considerable advances were made in this branch of science, howsoever closely connected with the well-being of mankind.

* *Fr. Redi*, de Animalculis vivis, quæ in Corporibus Animalium vivorum reperiuntur, Observationes. *Amstelod.* 1708. 12mo.

Among the more modern publications, that of M. Pallas unqueftionably holds a diftinguifhed rank. His *Thefis de infeftis viventibus intra viventia*, printed at Leyden in 1760, is an elaborate difquifition on this fubject, and is worthy of being particularly noticed, as containing not only very complete defcriptions and fpecific differences of worms infefting the body of man, but alfo a collected feries of the moft ufeful knowledge of preceding writers, with the various modes of extirpating thefe pernicious inmates.

To the almoft unparalleled induftry of Otto Frederic Müller the greateft merit is due, for his accurate defcription of the *Helminthic* order: and, probably, we owe to the Royal Society of Copenhagen, two publications which have fince fo much extended the knowledge of the prefent day, on the fubject of my paper. The *Premium*, of which I give the title below *, held forth by this Society, excited the diligence of M. Bloch of Berlin, and M. Goeze, to both of whom prizes were affigned. M. Bloch publifhed his Differtation, which was tranflated into French, under the title below recited †; the latter publifhed a Defcription of the fame animals, in quarto, *p.* 471. in the German language, with 44 plates. Gmelin, in his enlarged edition of the *Syftema Naturæ*, has enumerated feventy-eight fpecies of *Afcarides*, having arranged them according to the claffes of animals in which they exift; of which, twenty-four fpecies of birds are found to be infefted with thefe worms. Thofe I now fend are an addition to that number. M. Goeze alone, from references to his work in Gmelin, appears to have defcribed upwards of twenty

* An, Seminium vermium inteftinalium, Teniæ, Gordii, Afcaridis, Fafciolæ, &c. animalibus connatum; an, ab extus intromiffum; obfervationibus, et argumentis probare remediaque in illo cafu recenfere.

† Traité de la Generation des Vers des Inteftines et des Vermifuges. *Strafburgh*, 1788. 8vo. *p.* 127. *tab.* x. firft printed in German at Berlin in 1782.

Afcarides

Ascarides before unnoticed; exclusive of nine or ten kinds of the newly-named genus *Echinorynchus*, so nearly allied to the *ascaris*, as to be heretofore classed under the same name.

From this general view of this subject, there is little room to doubt, that *Ascarides* exist in a variety of other animals as yet unexamined: and although Gmelin does not refer any to the class of insects, I am assured by my friend Aylmer B. Lambert, Esq. that he saw a living worm crushed out of the body of the *Carabus hortensis*.

VI. *Observations on the Orcheston long Grass.* By *William George Maton, M. B. F. L. S.*

Read December 4, 1798.

IT must have been a matter of much surprize to many besides myself, reflecting how long the Orcheston grass has been known, and how frequent the opportunities have been for a full and accurate examination of it by botanists and agriculturists, that its history was so very contradictory and incomplete. It was not until I visited the meadow, and paid considerable attention to its produce, that I discovered the cause of this. The fact is, that the grass was examined by the different persons who have written upon the subject of it at very different seasons of the year, and each taking it for granted that it was a peculiar species, or at any rate a peculiar variety of some one species, made his report on that one only which chanced to be in its perfection at the period of his inspection. Hence one gentleman, who visited the spot about the latter end of July, pronounces the Orcheston grass to be exclusively *Agrostis stolonifera**. Another, happening to obtain his specimens earlier in the year, says, that *Poa trivialis* is the species †. Another observer, bearing stedfastly in mind that it has been described as a *peculiar* grass, increases the uncertainty, by declaring that, "by all the enquiries he has made, he has not found that this species of grass

* See *Memoirs of the Bath Society*, vol. i. p. 93.

† *Withering's Bot. Arr. of British Plants*, vol. ii. p. 144.

grows

grows in any other part of the kingdom*." This laſt opinion indeed has been moſt general, and it evidently originated from the account given of it in the *Indiculus Plantarum dub.* into which it was copied from Merret's *Pinax*, or at leaſt from How's *Phytologia Britannica*, (printed in 1650,) where is the earlieſt mention of this phenomenon in vegetation that I can find, and it is deſcribed as "*Gramen caninum, ſupinum, longiſſimum, non deſcriptum.*" Merret, however, remarked, in addition, that it was found in ſome parts of Wales. I apprehend that Ray never ſaw it. But I am at length ſatisfied that the long graſs of Orcheſton is not only not a ſpecies peculiar to the ſpot, but that it is compoſed of moſt of the ſpecies which grow in other meadows.

The meadow producing the graſs which has excited ſo much curioſity is ſituated in the loweſt part of a very narrow winding valley †, ſheltered on each ſide by gradual but by no means lofty acclivities of chalk. This valley forms a channel for the frequent floods which come down from Tilſhead (about three miles diſtant) in the Winter ſeaſon; and, from the meadow alluded to being the loweſt of the range, in regard to level, the water reſts there to ſome depth, if it does any where, and indeed the place is rarely otherwiſe than ſwampy throughout the year. There is one ſpring not half a mile diſtant, and therefore the water by which the meadow is often ſubmerged, may at firſt be of a higher temperature than the ſurrounding atmoſphere. The earlier the ſprings ſwell, the more plentiful is the ſucceeding crop of graſs. This circumſtance has conſtantly

* *Memoirs of the Bath Society*, vol. i. p. 95.

† Dr. Withering is incorrect in calling the diſtance of Orcheſton St. Mary from Saliſbury 19 miles; it is certainly not more than 11. The meadow is about half a mile from the village of Shrewton. It is at preſent rented by Farmer Sheats, of Orcheſton St. George.

been

been remarked by the neighbouring inhabitants. A bed of ſmall looſe pebbles, which are all of a ſiliceous nature, with a ſcanty covering of mould formed from the decompoſed relics of former vegetable generations, conſtitutes the immediate ſoil.

My laſt viſit to Orcheſton St. Mary was on the 15th of Auguſt laſt. I at that time found the following graſſes growing in the meadow, viz. *Holcus lanatus*, *Lolium perenne*, and *Agroſtis ſtolonifera.* All theſe were pretty nearly of the ſame length, meaſuring about ſeven feet. They uſually riſe, I underſtand, about 16 or 17 inches before they fall and run along the ground in knots, which knots ſend forth ſhoots into the interſtices of the pebbles. Moſt meadow graſſes ſo circumſtanced with reſpect to ſoil would probably become knotted. In June, *Triticum repens*, *Avena elatior*, *Alopecurus pratenſis*, and *Poa trivialis (paluſtris*, of Hudſon), are ſeen thriving ſimilarly to thoſe ſpecies above mentioned. I have ſpecimens of the laſt, which meaſure nearly ten feet in length. Some of the ſpikes of *Triticum repens* have between forty and fifty *glumæ*. Even *Conium maculatum*, growing in the ſurrounding hedges, reaches the height of ſeven or eight feet. Beſides graſſes, I have found in this remarkable meadow *Symphytum officinale*, *Convolvulus arvenſis*, *Potentilla reptans*, *Ranunculus pratenſis*, and *Oenanthe crocata*, all unuſually ſtrong and ſucculent, and ſtrikingly tall.

The crops of the Orcheſton graſs within late years have not by any means equalled what they have heretofore been. Perhaps the gradual deepening of the mould may be the cauſe of this, as it muſt deprive the crop more and more of the advantage ariſing from the diſpoſition of the pebbles, which (if I might venture a conjecture) ſeems to be a very important peculiarity in the ſituation. It is certain that the ſpace of only two acres and an half *has* yielded as much as ten tons of hay in one year. The firſt crop has uſually been cut

about

about the end of May, and the ſecond in July, or (which is rare) as late as the end of Auguſt. The tithes of the meadow have been rented more than once for 5*l.* the produce amounting to 25 hundred weight of hay.

The herbage of the adjoining meadows, I have remarked, is very exuberant; and this exuberance may be traced increaſing or declining according as the ſoil varies more or leſs from that of the principal meadow.

At the diſtance of a mile or two miles from Orcheſton, but in the ſame valley, ſome of the graſſes may be ſeen to put on an uncommon luxuriancy; and I have no doubt that, in proportion as meadows in other parts of the kingdom approach more nearly in circumſtances and ſituation to that of Orcheſton, the more ſimilar their produce will be found.

VII. *De-*

VII. *Description of a new Species of Mycteria. By George Shaw, M. D. F. R. S. V. P. L. S.*

Read December 4, 1798.

THE following is a description of a species of *Mycteria* or *Jabiru*, the skin of which was transmitted to me for examination by the Rev. Mr. Rackett, F. L. S. who received it from Mr. Bryer, of Weymouth.

It is said to be a native of Senegal. The length, from the tip of the bill to the ends of the claws, was six feet, two inches. The bill was thirteen inches in length, which is also the measure of that of the common Jabiru. The neck was fifteen inches. The body twelve inches. The naked part of the thigh eleven inches; the feathered or fleshy part four inches. The knee-joint one inch. The leg thirteen inches and a half. The foot, to the tip of the middle toe five inches and a half. The two outside toes are about an inch shorter than the middle one. The back toe scarcely quite two inches. A very slight approach towards a semipalmated appearance takes place at the first joint: the claws are small and blunt. The bill is pale or whitish at the base for near three inches from the setting on of the upper mandible, and one inch and a half from the lower: then succeeds a broad black zone across both mandibles, about three inches wide; well defined on the back part, but somewhat irregular in front. From this part the bill is pale, with a slight cast of reddish for about two inches, and from thence grows intensely red or of a vermilion colour to the tip. On each side the

upper mandible is a large ſemi-oval and ſemitranſparent ſpace, which, at its back part, is continued upwards in a curved direction acroſs the fore part of the eye. A little way down the upper part of the bill runs a bare flattened part, ſomewhat in the manner of the cere in the *Fulicæ* and other birds of that tribe. The whole head and neck are black, and covered with feathers, which, on the head, ſeem to have been ſmall and ſemi-ſetoſe on the front, but ſomewhat longer and larger on the occiput. Thoſe on the neck are ovate-lanceolate and of the uſual ſtructure, or as in the generality of birds. The plumage of the breaſt, back, thighs, &c. are alſo of the uſual ſtructure, but much more inclining to a rounded than lanceolate form. The wings were wanting: the ſhoulders alone remaining, for about the length of four inches; they were covered with white feathers. The ſcapulars, which were left on each ſide, were black, with whitiſh baſes: they were about fifteen inches in length. The whole remainder of the bird was white. The tail was entirely wanting. Beneath the baſe of the bill, on the ſkinny or gular part, were ſituated two very ſmall pear-ſhaped, pendant wattles, adhering by very ſmall necks: they were ſeated at about three quarters of an inch from each other, and in the dried ſpecimen were of a ſubſtance reſembling iſinglaſs. The legs are extremely long, and the thighs, to a diſtance nearly equal to that of the leg itſelf, are quite bare. The whole leg and thigh of a black colour, except that round the knee, as well as round each joint of the toes, is a pale band or zone. The whole length of the leg and thigh is coated with hexagonally-longitudinal ſcales or diviſions.

If this bird be collated with the deſcriptions of the *Myčteria Americana* or Common Jabiru, it will clearly appear to be a diſtinct ſpecies. It approaches much more nearly to the *Myčteria Auſtralis* or New Holland Jabiru, but, in that bird, there is not the ſlighteſt

 appearance

appearance of the membranaceous or femitranfparent part on each fide of the upper mandible. The colours alfo both of the bill and legs are widely different from thofe of the New Holland Jabiru; but it agrees with that fpecies in having the head and neck covered with feathers. Of the New Holland fpecies a beautiful fpecimen may be feen in the Leverian Mufeum, which, however, feems not to have quite attained to its full fize, fince it falls fhort of the meafurements marked in fome drawings executed in New Holland from the recent bird.

In order to elucidate as much as poffible this curious genus, I fhall conclude with giving the fpecific characters of all the three birds above mentioned. It is to be obferved, that in the *Syftema Naturæ* no fpecific character is given of the *Mycteria Americana* or Common Jabiru; that being then the only fpecies known to exift. It is now neceffary to form one for that fpecies; viz.

1. MYCTERIA *Americana*.

M. alba, capite colloque nudis nigris, zona colli inferioris rubra, occipite albido, roftro pedibufque nigris.

American Jabiru.

White Jabiru, with the head and neck naked and black; a red zone round the lower part of the neck; the occiput whitifh; the bill and legs black.

2. MYCTERIA *Auftralis*.

M. alba, capite colloque viridi-nigris; tectricibus, pennis fcapularibus caudaque nigris; roftro nigro, pedibus rubris.

New Holland Jabiru.

White Jabiru, with the head and neck green-black; the coverts, fcapulars, and tail black; the bill black, the legs red.

3. MYCTERIA

3. MYCTERIA *Senegalenſis.*

M. alba, roſtro apicem verſus rubro, baſin verſus albido faſcia nigra, macula utrinque feneſtrata.

Senegal Jabiru.

White Jabiru, with the bill red towards the tip, whitiſh towards the baſe, with a black tranſverſe band, and a tranſparent ſpot on each ſide.

I have added a repreſentation of the head of this ſpecies, half its natural ſize. TAB. III.

VIII. *A Sup-*

VIII. *A Supplement to the Plantæ Eboracenses printed in the Second Volume of these Transactions. By Robert Teesdale, Esq. F. L. S.*

Read December 4, 1798.

THE Linnean Society having honoured with a place in the Second Volume of their Transactions, p. 103, a paper entitled, *Plantæ Eboracenses*, I now beg leave to lay before them, as an addition to that paper, the following catalogue of Yorkshire plants: the former list was confined to a small part of the county, this is extended to the whole, that is, so far as my own observations, and the communications of my botanical friends, have enabled me; to which is added, such of the more rare plants as have not fallen under our observation, but are mentioned, as natives of the county, by Ray, Dillenius, Hudson, Smith, Dickson, and Withering.

Plants that are found in every part of our island are generally omitted, as they were in my former paper, excepting those of the Cryptogamia class.

It would be presumption in me to suppose that this list, and my former one, contain any thing like a complete Flora of so extensive a county; however I flatter myself the Society will do me the honour to accept of my efforts towards it, and wish they may be the means of exciting others of superior talents, to finish what I have only made a beginning of.

My two catalogues, including the common plants omitted, contain

tain about nine hundred and ten ſpecies*, excluſive of the Cryptogamia; and of theſe enumerated, though ſeveral extenſive genera are left out, there are about four hundred and fifty.

I have travelled over, and ſcrutinized, at different times, the greater part of the county; and the part which is celebrated for the more rare plants, that is, Ingleborough Hill, and its neighbourhood, has been viſited by almoſt all the curious botaniſts of the laſt and preſent age; notwithſtanding, many plants may yet remain undiſcovered, as it is well known by every practical botaniſt, that the more rare ones are extremely local, and of courſe are frequently overlooked by the moſt accurate obſervers. In fact, the botanizing of mountains is a laborious buſineſs; and they can only be minutely examined by perſons who are nearly reſident, as their viſits ſhould be frequent, and at all ſeaſons of the year.

The learned Dr. Goodenough having, in his excellent paper on the Britiſh ſpecies of *Carex*, changed ſome of their trivial names, and added ſome new ſpecies, it was preſumed it would be the moſt eligible to inſert in this paper, with the Doctor's names, the whole of thoſe which we have met with in the county, although the greater part of them are contained in my other paper: the ſame kind of repetition is likewiſe made in the *Polytricha*, having now adopted the names of the ingenious Mr. Menzies in that genus.

Turnham Green, Dec. 3d, 1798.

——————O Jehova,
Quam ampla ſunt tua opera!
Quam ſapienter ea feciſti!
Quam plena eſt terra poſſeſſione tua!

DAVID, *Pſalm* 104. *v.* 24.

* Sibthorp's *Flora Oxonienſis* contains 734 plants; and Relhan's *Flora Cantabrigienſis* contains 795, excluſive of the Cryptogamia.

TRIAN-

TRIANDRIA MONOGYNIA.

Crocus ſativus - - - *Hudſ.* 13. *With.* 68.
About Halifax. Rev. Mr. Wood. in *With.*

Valeriana rubra - - *Hudſ.* 12. *With.* 65.
Old walls, in various towns; probably as much a native of Yorkſhire as any other county.

Schoenus fuſcus? - - β. albus. *Hudſ.* 16. *With.* 80.
Bogs near Turington, growing among the S. albus; rare.

Scirpus pauciflorus - *With.* 74.
Houghton-moor, near Newbold, in the Eaſt-riding. Marſhes, near Beverley. It is not an uncommon plant.

maritimus - *Hudſ.* 21. *With.* 77.
Ditches, and in the Lake at Hornſea. Near Hull abundantly.

Eriophorum polyſtachion *With.* 72. *Leers t.* 1. *f.* 5.
Bogs. Wet meadows and paſtures, in many parts of the county. Near Beverley.

Mr. Dickſon was the firſt of our Britiſh authors who pointed out the diſtinctions between this and the E. anguſtifolium, in Tranſ. Linn. Soc. vol. 2. p. 289.

Obſ. I have frequently found plants of this genus, ſome hermaphrodite, and others dioicous; and in a more forward ſtate of their growth, I have obſerved ſome with long,

long, and others with ſhort down. It is probable there may be another ſpecies.

DIGYNIA.

Alopecurus bulboſus - *β.* geniculatus. *Hudſ.* 27. *With.* 120.
Places where water ſtands in the Winter. Near Hull.

Agroſtis pumila - - *Lightf. Frontiſpiece, vol.* 2.
Heaths near Harrowgate.

maritima - *With.* 132.
Sea-ſide. Bridlington Quay.

Aira montana - - *β.* ſetacea. *Hudſ.* 35.
Houghton-moor.

cæſpitoſa - - Var. 2. vivipera. *With.* 136.
Mountains in the Weſt-riding.
This always continues the ſame under cultivation.

Feſtuca loliacea - - *With.* 157.
Meadows. Near Beverley.

rubra - - *Hudſ.* 45. *With.* 153. *Leers t.* 8. *f.* 1.
Heaths. Dry Paſtures. Flamborough Head.

myurus - - *Hudſ.* 46. *With.* 151. *Leers t.* 3. *f.* 5.
On walls. Beverley.

Bromoides - *Hudſ.* 46. *With.* 151.
Turf walls. Dry Banks. On the Wolds.

dumetorum - *With.* 154
Meadows. Sides of hedges. Rare.

Poa.

Poa maritima - - *Hudſ.* 42. *With.* 147.
Hornſea. Banks of the Humber at Hull.

diſtans - - - *With.* 141. *t.* 25.
Yorkſhire. *Withering.*

glauca - - - *β.* pratenſis. *Hudſ. With.* 148.
Ingleborough Hill, and other mountains.

vivipara - - - *γ.* pratenſis. *Hudſ.*
Ingleborough and other hills.

nemoralis - - *With.* 146. *β.* anguſtifolia. *Hudſ.*
On walls, adjoining to woods, at Caſtle-Howard.

criſtata - - *With.* 145. Aira criſtata. *Linn. Hudſ.* 33.
Sandy heaths, and paſtures.

Melica montana - - *Hudſ.* 37. M. nutans. *With.* 138.
Woods, about Settle and Ingleton.

Arundo arenaria - *Hudſ.* 54. Calamagroſtis arenaria. *With.* 123.
Hornſea. Bridlington Quay.

Elymus arenarius - *Hudſ.* 56. *With.* 170.
In the Sands at Hornſea, and Bridlington Quay.

Obſ. We have two varieties of this; one very glaucous, which is not ſo tall nor large as the other which is leſs glaucous.

Seſleria cœrulea - - *With.* 140. Cynoſurus cœruleus. *Hudſ.* 59.
Limeſtone rocks. Ingleborough. Settle. Ingleton.

Triticum junceum - *Hudſ.* 58. *With.* 173.
Sea-ſide, Hornſea.
β junceum. *Hudſ.* With the above.

Triticum loliaceum - *Eng. Bot.* 221. Triticum maritimum. *With.* Poa loliacea. *Hudſ.* 43.
Sea-ſhore. Not common.

Lolium arvenſe - - *With.* 168.
Walkington fields. Near Beverley.

Bromus ſecalinus - *Smith in Tranſ. Linn. Soc. vol.* 4. *p.* 281.
Corn-fields at Bulmer. Market Weighton. Near York.

racemoſus - Meadows at Beverley.
I have a variety much ſmaller in the whole habit; the upper part of the ſtraw and panicle are purple. It grows in wet marſhes near Beverley, and is the only ſpecies of the genus I ever obſerved in that kind of ſituation. I ſhewed my ſpecimens of this plant to the learned Dr. Smith, who informed me, they were the true B. racemoſus of Linnæus.

arvenſis - - Corn-fields at Little Weighton, amongſt wheat, where it was ſix feet high. ⊙ VII.
Obſ. This is rare. What I have named B. arvenſis in my former paper, were ſome large plants of the B. racemoſus.

erectus - - Wolds. Very common; ſome meadows near Newbold, almoſt wholly of it.
Obſ. The yellow, or orange-coloured Anthera, diſtinguiſhes this from all its congeners.

TETRANDRIA MONOGYNIA.

Dipsacus pilosus - - *Hudſ.* 61. *With.* 182.
Woods near Beverley. Colonel Machell.
Various places in the North-riding.

Centunculus minimus *Hudſ.* 63. *With.* 198.
Houghton-moor, the ſide next to Newbold. I have not heard of this being found in any other part of the county.

Plantago maritima - γ. *Hudſ.* 64.
Mountains near Settle.

Galium erectum - - *Hudſ.* 68. *With.* 189.
Moiſt meadows and paſtures near Helmſley. Rare.

pusillum - - Near Leckonfield. Rare.

montanum - *With.* 187. *t.* 28.
Walkington Wood, near Beverley.

anglicum - *Hudſ.* 69. *With.* 191.
Near Boynton, the Seat of Sir George Strickland, Bart. Mr. Knowlton, F.L.S.

Alchemilla alpina - *Hudſ.* 71. *With.* 205.
Mountains in Yorkſhire. *R. Syn.*

TETRAGYNIA.

Sagina apetala - - *With.* 216. β. procumbens. *Hudſ.* 73.
Corn-fields. On walls.

Potamogeton marinum *Hudſ.* 76.
Ditches at the garriſon at Hull.

marinum *Vaill. t.* 32. *f.* 3.
Ditches near the ſea at Hornſea.

Obſ.

Obf. I take this to be very different from the common P. marinum. Vaillant's figure is a good reprefentation.

Potamogeton paluftre - foliis inferioribus fubmerfis lanceolatis membranaceis feffilibus, fuperioribus ovali-lanceolatis petiolatis coriaceis natantibus.

Ditches near Beverley.

Obf. This has generally been taken for a var. of the P. natans.

PENTANDRIA MONOGYNIA.

Anchufa fempervirens - *Hudf.* 80. *With.* 227.

By the road between Settle and Ingleton.

Primula elatior - - *With.* 234. *β.* vulgaris. *Hudf.* 84.

Under hedges—Sides of woods, not very common.

Convolvulus Soldanella *Hudf.* 89. *With.* 240.

Owthorn, on the Holdernefs coaft, where it has been found by Henry Grimfton, Efq. F. L. S.

Lyfimachia thyrfiflora - *Hudf.* 86. *With.* 237.

In the Eaft-riding. *Ray's Syn.*

I could not find it, but it may poffibly be there, as there are large tracts of marfh lands, the kind of fituation it is faid to prefer.

Polemonium cœruleum *Hudſ.* 89. *With.* 241. *Eng. Bot.* 14.
Near Settle. Ingleton. Malham Cove.

Ribes alpinum - - *Hudſ.* 99. *With.* 264.
On the walls of Fountains Abbey.

Ribes ſpicatum - - *With.* 265. *Linn. Tranſ. vol.* 3. *p.* 240. *t.* 21.
Near Richmond. Mr. Robſon, in Tranſ. of the Linnean Society.

rubrum - - *Hudſ.* 99.
In the Northern parts of the county. Wenſleydale.

Glaux maritima - *Hudſ.* 101. *With.* 268.
Sea ſhores. Banks of the Humber.

Vinca minor - - *Hudſ.* 91. *With.* 268.
Near Kirkham Abbey, and Weſtow. Mr. Grimſton.

Campanula hederacea *Hudſ.* 97. *With.* 244.
Near Halifax. Mr. Bolton, in *Hudſ.*

Anagallis cœrulea - *Hoffm. Germ. Fl.* 70. *ß.* arvenſis. *Hudſ.* 87.
Malton corn-fields.

Obſ. Mr. Knowlton informs me, that this plant has ſown itſelf many years in the garden at Londeſbrough, and that it never varies: I therefore preſume it may be a diſtinct ſpecies, though I do not perceive the difference in the calyx, mentioned by Hoffman.

Verbaſcum nigrum - *Hudſ.* 90. *With.* 250.
North, and Weſt-ridings, in many places.

Rhamnus Frangula - *Hudſ.* 98. *With.* 259.

5 Houghton-

Houghton-moor. This is rather a rare plant in the North of England, but is very common in all the hedges in ſome parts of Wiltſhire.

DIGYNIA.

Chenopodium maritimum *Hudſ.* 107. *With.* 273.
Flamborough Head. Col. Machell.

Beta maritima - - *Hudſ.* 108. *With.* 277.
Bridlington Quay.

Eryngium maritimum *Hudſ.* 109. *With.* 283.
Hornſea, ſparingly. Hollym in Holderneſs.

campeſtre - *Hudſ.* 110. *With.* 285.
Below Melling, plentifully. *Hudſ.*

Bupleurum tenuiſſimum *Hudſ.* 111. *With.* 285.
Near Stockton, Yorkſhire. Mr. Robſon.

Selinum paluſtre - - *Hudſ.* 115. *With.* 293.
Marſhes, near Beverley, abundantly.

Caucalis daucoides - *With.* 287.
Corn-fields near Malton. Thorp-arch. This is C. leptophylla in my former paper.

nodoſa - - *Hudſ.* 114. *With.* 289.
Tordylium nodoſum, in my former paper. Wall roots. Gravelly corn-fields.

ſcandicina - *With.* 289. Scandix Anthriſcus. *Hudſ.*
Garriſon walls at Hull.

Scandix odorata - - *Hudſ.* 124. *With.* 306.
In the wood at Knareſborough, where the

the dropping well is. Near Leeds. Mr. Wood, in *Withering*.

Smyrnium olufatrum - *Hudf.* 126. *With.* 310. *Eng. Bot.* 330.
Near Beverley, rare. About Scarborough Caftle. *Hudf.*

Athamanta Meum - *Hudf.* 116. *Linn.* Æthufa Meum. *With.* 305.
The mountainous parts of the Weft-riding, fparingly.

Carum Carvi - - *Hudf.* 126. *With.* 311.
Meadows adjoining the river Humber near Hull, fo plentifully that the poor people gather the feed to difpofe of to the druggifts.

On the Wolds near Londefbrough.

Pimpinella magna - *With.* 313. P. major. *Hudf.* 127.
About Knarefborough. Helmfley. Caftle Howard. Richmond.

diffecta - *Retz.* *With.* 312.
On the Wolds—near Beverley.

Apium graveolens - *Hudf.* 128. *With.* 314.
Marfhy ground near the fea. Hull.

Sium repens - - *Sibth. Oxon.* 97. *With.* 300.
Ditches about Beverley.

Oenanthe crocata - *Hudf.* 121. *With.* 302.
River-fides, and ditches, in the North-riding.

TRIGYNIA.

Sambucus Ebulus - *Hudf.* 130. *With.* 316.

Lund, in the Eaſt-riding. Many places in the North-riding.

Staphylea pinnata - *Hudſ.* 131. *With.* 317.
Hedges near Pontefract. *R. Syn.*

TETRAGYNIA.

Parnaſſia paluſtris - *Hudſ.* 131. *With.* 319.
Wet meadows. Paſtures, and heaths.

PENTAGYNIA.

Statice Armeria - - *Hudſ.* 132. *With.* 319.
Sea coaſt. Humber banks. Ingleborough Hill.

HEXANDRIA MONOGYNIA.

Galanthus nivalis - *With.* 331.
Hedges, and orchards: probably from gardens.

Convallaria majalis - *Hudſ.* 146. *With.* 341.
About Thorp-arch. Knareſborough. Woods in Craven. Mr. Caley in *With.*

multiflora *Hudſ.* 147. *With.* 342.
Woods, at Studley Park.

polygonatum Helks-wood, at Ingleton, and other rocky woods, near Settle. Sykes-wood. Curtis.

Narciſſus biflorus - *Linn.* *Eng. Bot.* 276. *With.* 332.
Banks of the river Wherf, at Thorp-arch, in plenty. Mr. Knowlton.

Pſeudo-

Pſeudo-Narciſſus - *Eng. Bot.* 17. *Hudſ.* 141. *With.* 332.
With the above, at Thorp-arch.

Juncus campeſtris - β. *Linn. Fl. Lapp. t.* 10. *f.* 2.
Marſhes, and bogs, near Beverley.
I have ſown the ſeeds, and it does not vary.
It is different (as the figure quoted above ſhews) from the Gramen hirſutum elatius, panicula juncea compacta. *R. Syn.* 416. which I believe will likewiſe be found to be a diſtinct ſpecies. I have not cultivated this, ſo as to be ſatisfied of it. J. campeſtris, var. elatior. *Sibth.*

ſylvaticus - *Hudſ.* 151. J. maximus. *With.* 349.
Woods, common.

Acorus Calamus - - *Hudſ.* 147. *With.* 343.
Ponds, at Riſby—near Beverley.

Allium Schoenopraſum *With.* 335.
Meadows, near Kirby-moor-ſide. Mr. Flintoff, in *With.*

carinatum - *Hudſ.* 139. *With.* 333.
Among rocks, at Conyſtone, and Kilnſay. Curtis.

Ornithogalum umbellatum *Hudſ.* 143. *With.* 337.
In a field, near Knareſborough. Mr. Robſon, in *With.*

luteum *Hudſ.* 143. *With.* 336.
Wellburn, near Kirby-moor-ſide. Mr. Grimſton. Near Greta-bridge, and Bignal.

Bignal. *R. Syn.* and Mr. Robſon. Near Doncaſter. Mr. Toſield. Under Malham Cove. Mr. Wood, in *With.*

TRIGYNIA.

Triglochin maritimum *Hudſ.* 152. *With.* 359.
Sea-ſide. Humber banks, at Hull.

Rumex digynus - - *Hudſ.* 156. *With.* 357.
Mountains, in the North and Weſt Ridings.

maritimus - *Hudſ.* 155. *With.* 356.
Woodmanſey, near Beverley.

aureus - - *With.* 356. *β.* maritimus. *Hudſ.*
With the above, at Woodmanſey.

Colchicum autumnale *Hudſ.* 157. *With.* 359.
Near Ferrybridge. Knareſborough. South Dalton.

POLYGYNIA.

Aliſma natans - - *Hudſ.* 158. *With.* 362.
Lake at Hornſea. I have not ſeen it in flower.

ranunculoides *Hudſ.* 158. *With.* 362.
β. ranunculoides. *Hudſ.*
Ditches, near Beverley.

lanceolata - *With.* 362. *β.* A. plantago. *Hudſ.*
Marſhes, near Beverley.

MISSOURI
BOTANICAL
GARDEN.

OCTANDRIA MONOGYNIA.

Epilobium tetragonum *Hudſ.* 162. *With.* 368.
Woods, near Beverley; and in the North Riding.

alpinum - *Hudſ.* 163. *With.* 368.
Sides of rivulets in the mountainous parts of the Weſt Riding. Near Settle.

Chlora perfoliata - *With.* 369. *Hudſ.* 168.
Upon the Wolds, near Beverley. Between Doncaſter and Ferrybridge.

Vaccinium Vitis-idæa *Hudſ.* 164. *With.* 371.
Heaths, in the North and Weſt Ridings. Near Harrowgate.

Erica vulgaris - -
Tetralix - -
cinerea - -
} Varieties with white flowers, on heaths near Harrowgate.

TRIGYNIA.

Polygonum minus - *Hudſ. Ed.* 1. 148. *With.* 380.
Woodmanſey, near Beverley, in a place where water ſtands in the Winter.

viviparum *Hudſ.* 169. *With.* 383.
Near Settle. Mr. Knowlton.
Wenſleydale. Curtis.

DECANDRIA MONOGYNIA.

Pyrola minor - - *Hudſ.* 176. *With.* 401.

Woods at Hackfall. Haſlewood. Near Clapham.

Pyrola ſecunda - - Haſlewood, near Sir Walter Vavaſor's Park. *R. Syn.*

Andromeda polifolia - *Hudſ.* 176. *With.* 398.
Upon the hills above Keighley, and abundantly on all that ridge of mountains which ſeparates Yorkſhire from Lancaſhire. Mr. Knowlton.
Bogs near Howden.

Arbutus uva urſi - *Hudſ.* 177. *With.* 399.
Specimens, from near Halifax.

DIGYNIA.

Saxifraga umbroſa - *With.* 403.
Reddins Gill, near Keighley. Mr. Knowlton.

ſtellaris -	*Hudſ.* 179. *With.* 402.	These are found on the rocky mountains in the Weſt Riding. On Ingleborough, Hinklehaugh, Malham Cove, and in various places, about Settle, and Ingleton.
oppoſitifolia	- - - -	
autumnalis -	*Hudſ.* aizoides. *With.*	
hypnoides	- - - -	
anguſtifolia -	*Curtis.* - - -	

Saponaria officinalis - *Hudſ.* 183. *With.* 408.
Near Shipton, a village between York and Market Weighton. Cottingham-moor.

Dianthus Caryophyllus *Hudſ.* 184. *With.* 410.
On the walls, at Fountains Abbey.

TRIGYNIA.

Silene nutans - - *Hudſ.* 188. *With.* 413.
On the rocks, about Knareſborough.

amoena - - *Hudſ.* 188. S. maritima. *With.* 414.
Sea-ſide, at Hornſea.

Stellaria media - - *Sibth. Fl. Oxon.* 141. S. glauca. *With.* 420.
Marſhes, near Beverley. Firſt pointed out to me by Col. Machell.

uliginoſa - *With.* 420. γ. S. graminea. *Hudſ.* 190.
Marſhes. Sides of ditches.

Arenaria peploides - *Hudſ.* 191. *With.* 421. *Eng. Bot.* 189.
At Hornſea. Bridlington Quay.

verna - - Mountains, about Settle.

laricifolia? - *Hudſ.* 192.
Upon Hinklehaugh.

PENTAGYNIA.

Cotyledon lutea - *Hudſ.* 194. *With.* 426.
Walls, and rocks, in the Weſt Riding. Mr. Tofield, in *Hudſon.*

Sedum Telephium - *Hudſ.* 195. *With.* 426.
Walls, and rocks, in the North and Weſt Ridings.

anglicum - - *Hudſ.* 196. *With.* 428. S. rubens. *Lightf.*
Rocks, in the Weſt Riding. Near Harrowgate.

villoſum - - *Hudſ.* 197. *With.* 426.
Ingleborough, Hinklehaugh, Hartſide Hills, in the Weſt Riding.

Ceraſtium

Ceraſtium ſemidecandrium *Hudſ.* 200. *With.* 435.
Barnby-moor, near Pocklington: this is not a common plant in Yorkſhire.

arvenſe - *Hudſ.* 201. Borders of corn-fields.

aquaticum *Hudſ.* 202. *With.* 436.
Sides of ditches, near Beverley.

Spergula laricina - *Hudſ.* 203. *Lightf.* S. ſaginoides. *Curtis.* S. ſubulata. *With.* 436.
Barnby-moor. Near Pocklington. Rare.

DODECANDRIA TRIGYNIA.

Euphorbia ſtricta - *Eng. Bot.* 333. E. verrucoſa. *Hudſ.* 209. *With.* 449.
Near York. *Ray's Syn.*

ICOSANDRIA MONOGYNIA.

Prunus Padus - - *Hudſ.* 213. *With.* 455.
Woods, and hedges, in the North and Weſt Ridings. About Ingleborough. *Curtis.*

DIGYNIA.

Cratægus Aria - - *Hudſ.* 214. *With.* 458.
Mountainous parts of the North and Weſt Ridings. Knareſborough.

PENTAGYNIA.

Spiræa ſalicifolia - *With.* 463.

In a hedge between Green Hammerton and Knareſborough, far from any houſe or garden; and as Dr. Withering informs us that it has been found in Weſtmoreland and Cumberland, I have now ventured to add it to our Yorkſhire catalogue.

POLYGYNIA.

Roſa villoſa - - *Hudſ.* 219. *With.* 466.
Woods, hedges, and ſhady ſituations—very common.

Rubus chamæmorus - *Hudſ.* 221. *With.* 471.
In peat earth, on the tops of the higheſt hills. Ingleborough. Kirby Fell, Fountains. Bulſworth. Hinklehaugh.

Geum intermedium - *Curtis.* G. rivale. var. 2. *With.* 478.
Woods in the North Riding. Walkington-wood, near Beverley; found there by the Rev. Mr. Rigby.

Potentilla fruticoſa - *Hudſ.* 222. *With.* 472.
On the South banks of the Tees, below Thorpe, and Egglеſton Abbey, and alſo near Greta Bridge, and Mickleforce Teeſdale. *R. Syn.* It ſtill grows abundantly in the above places. Mr. Robſon, in *With.*

Dryas octopetala - *Hudſ.* 226. *With.* 478.
On Arncliff Clowder, in Littendale, near Kilnſay. *Curtis.* Near Settle. Dr. Fell. In the Craven part of Yorkſhire. Mr. Wood. *Withering.*

POLY-

POLYANDRIA MONOGYNIA.

Chelidonium glaucium *Hudſ.* 229. *With.* 484.
Sea-ſide, in various places. Hornſea. Bridlington Quay.

PENTAGYNIA.

Aquilegia vulgaris - *Hudſ.* 235. *With.* 495.
Weſtwood, at Beverley. Upper part of Girling Trough, near Coniſtone, Kilnſay. *Curtis.*

POLYGYNIA.

Anemone Pulſatilla - *Hudſ.* 237. *With.* 498.
Dry paſtures, in the neighbourhood of Pontefract.

Thalictrum minus - *Hudſ.* 238. *With.* 501.
Thorpe-arch. About Settle, and Ingleton.

majus - *With.* 502. *Jacq. auſtr.* 420.
In Holderneſs, by Mr. Knowlton: he cannot recollect the exact ſpot.

Helleborus fœtidus - *Hudſ.* 245. *With.* 510.
In Lanes at Campſall, near Doncaſter.

DIDYNAMIA GYMNOSPERMIA.

Mentha ſylveſtris - *Hudſ.* 250. *With.* 521.
At Thorn. Mr. Robſon, in *Withering.*

rotundifolia - *Hudſ.* 251. *With.* 522.

Near

		Near Saltburn, by the ſea, in a dry ſandy place. Mr. Robſon, in *Withering*.
Mentha pulegium	-	Wet commons. Near Terrington.
Galeopſis villoſa	-	*Hudſ.* 256. G. grandiflora. *With.* 528. Sandy corn-fields. Not uncommon.
Tetrahit	-	δ. *Hudſ.* 257. G. cannabina. *With.* 529. Corn-fields, between Beverley and Sancton. Near Green Hammerton.
Galeobdolon luteum	-	*Hudſ.* 257. *With.* 530. Woods, at Bingley. Mr. Knowlton.
Stachys arvenſis	-	*Hudſ.* 260. *With.* 532. Common, in light arable land. Near Malton. Walkington, near Beverley.
Leonurus Cardiaca	-	*Hudſ.* 261. *With.* 534. Between Tickhill and Workſop. *Hudſ.*
Origanum Onites	-	*Hudſ.* 262. O. vulgare. var. 2. *With.* 535. About Clapham. Mr. Caley, in *With.*
Meliſſa Calamintha	-	*Hudſ.* 263. *With.* 538. Dry banks, near Biſhop Burton.
Nepeta	-	Neighbourhood of Malton.

ANGIOSPERMIA.

Orobanche elatior	-	*Tranſ. Linn. Soc. vol.* 4. 178. This is the O. major, in my former paper.
Melampyrum criſtatum		*Hudſ.* 269. *With.* 544. Among corn, at Waltonfield, near Wakefield. *With.*
pratenſe		*Hudſ.* 270. *With.* 545.

Woods,

Woods at Beverley. At North Bierley. Dr. Richardfon.

Melampyrum fylvaticum Woods at Caftle Howard.

Antirrhinum Cymbalaria *Hudf.* 271. *With.* 549.
On walls at Londefbrough, where it was planted by the late Mr. Knowlton, and is naturalized, as on the walls London.

minus - Malton, and Walkington fields.

majus - Garden walls, and churches, in and near towns.

TETRADYNAMIA SILICULOSA.

Myagrum fativum - *Hudf.* 277. Moenchia fativa. *With.* 562.
Among clover at Efk, near Beverley: poffibly the feed of the clover might have been foreign, and this plant introduced with it. I have frequently feen it mixed with foreign flax feed.

Bunias Cakile - - *Hudf.* 298. *With.* 562.
Sea-fhore, Hornfea.

Draba muralis - - *Hudf.* 278. *With.* 566.
Fiffures of the limeftone rocks, about Settle, Ingleton, and Malham.

incana - - I found this in the fame fituations as the laft, but fparingly. On a rock near the fummit of Ingleborough, on the weft

ſide. Mr. Woodward. *With.* Roſeberry Coppin. Mr. Robſon.

Lepidium latifolium - *Hudſ.* 279. *With.* 567.
Amongſt the rocks at Plumpton. In the neighbourhood of Knareſborough.

Thlaſpi arvenſe - *Hudſ.* 281. *With.* 568.
Corn-fields, between Londeſbrough and Shipton. Mr. Knowlton.

campeſtre - Sandy fields. Not uncommon.

montanum - *Hudſ.* 282. *With.* 570.
Mountainous paſtures, about Settle, and Ingleton. Near the ebbing and flowing Well. *Hudſ.*

alpeſtre - *Eng. Bot.* 81. *With.* 570.
Moiſt limeſtone paſtures, about Settle.

Cochlearia officinalis - *Hudſ.* 283. *With.* 572.
Sea-ſhore. Ingleborough Hill.

groenlandica Ingleborough Hill. Flamborough Head.

Armoracia Banks of rivers. Beverley.

SILIQUOSA.

Cardamine bellidifolia *Hudſ.* 293. *With.* 577.
Said to grow in various places, about Ripon, in *R. Syn.* I could not meet with it.

impatiens Sides of rivulets in the North and Weſt Ridings. About Settle. Near Richmond.

flexuoſa - *With.* 578.

I have

I have ſpecimens gathered in the North Riding, but cannot recollect the place.

Siſymbrium ſylveſtre - *Hudſ.* 296. *With.* 581.
Marſhes, and ſides of ditches, at Beverley. Near Leeds. Mr. Wood, in *With.*

terreſtre - *With.* 582. *Curt.* 289.
At Cottingham.

Cheiranthus Cheiri - *Hudſ.* 287. *With.* 586.
Old walls, about towns.

Arabis thaliana - *Hudſ.* 292. *With.* 587.
Sandy dry banks. On walls.

Turritis hirſuta - - *Hudſ.* 291. *With.* 589.
On the Wolds, near Beverley, and many other places.

Braſſica oleracea - *Hudſ.* 289. *With.* 591.
Sea cliffs at Staiths. Mr. Robſon, in *With.*

muralis - - *Hudſ.* 290. *With.* 592. Siſymbrium murale. *Linn.*
Garriſon walls at Hull. Old walls at Malton.

MONADELPHIA DECANDRIA.

Geranium moſchatum *Hudſ.* 300. *With.* 609.
Craven. *R. Syn.* Hornſea. *With.*

phæum - In woods, about Settle, and Ingleton.

ſylvaticum Woods, and hedges, near the Wherf, at Bolton.

Bolton. Mr. Knowlton. About Settle, and Ingleton.

Geranium pyrenaicum Banks of the river, between Bingley and Keighley. *Hudſ.*

lucidum - Walls, and ſtony places, in the North and Weſt Ridings.

columbinum I have ſpecimens which I collected in the Eaſt Riding, but cannot recollect the place.

puſillum - *Linn.*—parviflorum. *Sibth. Fl. Oxon. Ray's Syn. t.* 16. *f.* 2.

Sandy banks, at Bridlington Quay. Kexby Bridge, near York.

DIADELPHIA HEXANDRIA.

Fumaria capreolata - *With.* 621. F. officinalis. *β.* capreolata. *Hudſ.* 309.

Stony places, at Harrowgate, and Thorpe-arch.

claviculata - Among the rocks of Stonehall, ſeven miles from Leeds. Mr. Wood, in *With.*

DIADELPHIA DECANDRIA.

Ulex europæus - - *β. Hudſ.* Geniſta ſpinoſa minor. *Park.* 1003.
On heaths, in the ſouthern part of the county.

Obſ. This is certainly a ſpecies. See *R. Syn.* and *With.*

Ononis arvenſis - - *With.* 627. O. inermis. *Hudſ.* 312.
Paſtures, heaths, and meadows.
β. repens. *Hudſ.*
Sea-ſhore, at Hornſea.

Anthyllis vulneraria *Hudſ.* 313. *With.* 629.
Meadows, and paſtures, in gravelly and calcareous ſoils. Sea-ſhores.

Lathyrus Niſſolia - *Hudſ.* 315. *With.* 632.
At Sigglesthorne, commonly called Silſton, in Holderneſs, found there by Mrs. Wharton.

paluſtris - In the marſhes, near Beverley, abundantly.

Vicia lathyroides - *Hudſ.* 318. *With.* 638. *Eng. Bot.* 30.
Under hedges, and buſhes, in dry paſtures. Near Beverley.

bithynica - - Gravelly corn-fields, and paſtures, and ditch banks, near Doncaſter. Mr. Tofield, in *Hudſ.*

Hippocrepis comoſa - *Hudſ.* 321. *With.* 641. *Eng. Bot.* 31.
Limeſtone rocks, at Malham, Settle, and Ingleton. Common in various parts of the North and Weſt Ridings, but never ſaw it in the Eaſt.

Aſtragalus glycyphyllos *Hudſ.* 322. *With.* 643.
Near Flaxby, a village near Knareſborough.

Trifolium

Trifolium ornithopodioides *Hudſ.* 324. T. melilotus ornithopodioides. *With.* 645. *R. Syn.* 331. *t.* 14. *f.* 1.
Half a mile from Tadcaſter, towards Sherborn. *R. Syn.*

ſtriatum - *Hudſ.* 327. *With.* 649.
Sandy fields, at Leven in Holderneſs. Near Caſtle Howard.

alpeſtre - *Hudſ.* 326. T. medium. *With.* 650.
Among buſhes. Edges of woods. Sea-ſhore, at Bridlington Quay.

SYNGENESIA POLYGAMIA ÆQUALIS.

Lactuca viroſa - - *Hudſ.* 337. *With.* 677.
On dry banks, and in hedges. Near Beverley.

Picris echioides - - *Hudſ.* 342. *With.* 673.
Sides of ditches, in lanes, near Beverley.

Hieracioides - *With.* Hedypnois Hieracioides. *Hudſ.* 342.
Borders of corn-fields, where the land is ſtony.

Leontodon palludoſum *Lightf. Fl. Scot.* 432. L. Taraxacon. *With.* 679. L. Taraxacum. δ paluſtre. *Hudſ.* 339.
Sides of ditches, in the marſhes, Beverley.

hirtum - *With.* 682. Hedypnois hiſpidum β hirtum. *Hudſ.* 340.
Near Beverley.

Hieracium

Hieracium murorum - *Hudſ.* 344. *With.* 686.
Woods, and rocky places, in the North and Weſt Ridings. About Caſtle Howard. Bolton Abbey. *With.*

villoſum - *With.* 687. *Jacq. auſtr.* 87.
Clefts of rocks, near Mur Gill, at the foot of Ingleborough. Mr. Caley, in *With.*

Crepis biennis - - *With.* 690. Hedypnois biennis. *Hudſ.* 342.
On the Wolds, weſt of Biſhop Burton. Rare.

Hypochæris maculata *Hudſ.* 346. *With.* 691.
Near Ottermine cove, Settle. Mr. Caley, in *With.*

glabra - *Hudſ.* 347. *With.* 692.
On the common, cloſe to the inn, at Banktop, near Barnſley. Mr. Wood, in *With.*

Cichorium Intybus - *Hudſ.* 348. *With.* 693.
Borders of corn-fields, common in the North and Weſt Ridings, but I have not ſeen it in the Eaſt Riding.

Serratula tinctoria - *Hudſ.* 349. *With.* 695.
Near Londeſbrough.—This is one of the plants which are rare in the Eaſt Riding, but common in the other two.

Carduus eriophorus - *Hudſ.* 354. *With.* 700.
Road ſides, in various parts of the county.

county. Between Market Weighton and Londeſbrough.

Carduus pratenſis - *Engl. Bot.* 177. *Hudſ.* 353. *With.* 701.
Houghton moor.

— helenioides - *Hudſ.* 352. *With.* 702.
In a wood near Londeſbrough; ſhewn me by Mr. Knowlton. Rocky paſtures, in the mountainous parts of the county.

Carlina vulgaris - - *Hudſ.* 355. *With.* 704.
Dry paſtures, and heaths. Near Beverley.

POLYGAMIA SUPERFLUA.

Artemiſia maritima - *Hudſ.* 358. *With.* 709.
Banks of the Humber, at Hull.

Conyza ſquarroſa - - *Hudſ.* 362. *With.* 717.
In the North and Weſt Ridings. Thorpe arch. Mr. Grimſton.

Erigeron acre - - *Hudſ.* 363. *With.* 718.
On the Wolds, frequent.

Tuſſilago hybrida - *Hudſ.* 364. *With.* 721.
Near the river Wherf, between Ilkley and Skipton, in Craven.

Senecio ſaracenicus - *Hudſ.* 367. *With.* 726.
Near Halifax, in the fields, about Salkeld. *R. Syn.* About Clapham, and Ingleton. *Hudſ.*

Solidago cambrica - - *Hudſ.* 367. *With.* 728.

Mountains

Mountains in the Weſt Riding.

On the rocky precipice on the ſummit of Ingleborough, to the north-weſt. Mr. Woodward, in *With.*

Aſter Tripolium - *Hudſ.* 368.

β. Lightf. Var. 2. *With.*

Sea-ſhore at Hornſea.

Doronicum Pardalianches *With.* 732.

Near the World's end, at Harrowgate. Mr. Manby, in *With.*

Matricaria maritima - *With.* 736. M. inodora. *γ. Hudſ.* 373.

Flamborough Head. Rare.

POLYGAMIA FRUSTRANEA.

Centaurea Calcitrapa *Hudſ.* 376. *With.* 745.

Sands end, near Whitby. Mr. Robſon, in *With.*

MONOGAMIA.

Jaſione montana - - *Hudſ.* 377. *With.* 247.

Bulmer corn-fields. Sandy fields, between Weighton and Sanċton.

Obſ. I have ſeen this plant upon heaths, with all the appearance of a perennial root; and Mr. Swainſton's gardener ſhewed it to me in his maſter's fine collection, where it is aſſuredly perennial.

Viola hirta - - *Hudſ.* 379. *With.* 260.

Woods at Caſtle Howard.

Londeſbrough, and Thorpe arch. Mr. Knowlton.

Viola arvenſis - - foliis ovato-oblongis dentatis, floribus calyci hirſuto æqualibus. *Hoffm. Germ. Fl.* 311.
Sandy ſoil, in arable land, very frequent.

Impatiens noli-me-tangere *Hudſ.* 380. *With.* 263.
Roots of the old walls in Fountains Abbey.

GYNANDRIA DIANDRIA.

Orchis latifolia - - *Hudſ.* 385. a variety with ſtraw-coloured flowers.
Bogs, and marſhes, near Beverley.

Ophrys aranifera - *Hudſ.* 392. *With.* 39.
Dry paſtures, about Branham (probably Bramham) near Tadcaſter. *With.*

Cypripedium Calceolus *Hudſ.* 392. *With* 43.
About Arncliffe, Kilnſay, Litten, and Kettlewell. Mr. Knowlton.
I believe this plant is nearly eradicated in Helks-wood.

Serapias enſifolia - *With.* 42. S. longifolia. γ. *Hudſ.* 394.
Woods at Settle, and Ingleton. Helks-wood. In Cum Hag, a wood at Caſtle Howard. This is S. longifolia in my former paper.

rubra - - *With.* 42. *Engl. Bot.* S. longifolia. δ. *Hudſ.* 394.
About Clapham, and Ingleton, *Hudſ.*
I have a ſpecimen of this rare plant, but cannot recollect where it was found.

MONOECIA DIANDRIA.

Lemna gibba - - *With.* 44. L. minor. *β.* gibba. *Hudſ.* 399.
Ditches at Beverley.

TRIANDRIA.

Typha anguſtifolia - *Hudſ.* 400. *With.* 111.
Old marle-pits, between York and Market Weighton.

Sparganium natans - *With.* 112. *Engl. Bot.* 273. S. ſimplex, natans *β.* *Hudſ.* 401.
Ditches in Swinemoor, at Beverley.

Carex dioica - - *Goodenough. Tranſ. Linn. Soc. vol.* 2. 139. *Hudſ.* 401. *With.* 86.
In bogs, very frequent.

pulicaris - - *Leers, t.* 14. *f.* 1.
Bogs, wet meadows, and paſtures.

ſtellulata - C. muricata. *Hudſ.*
Bogs, marſhes, ſides of rivulets.

curta - - C. brizoides. *Hudſ.* C. caneſcens. *Lightf.*
I have only found this rare ſpecies in Terrington Car.

ovalis - - C. leporina. *Hudſ. Lightf.*
Woods, and moiſt clayey paſtures.

remota - - Woods, and ſides of ditches.

axillaris - - Sides of ditches, at Beverley, ſhewn me by Colonel Machell.

Carex arenaria - - *With. ed.* 3. *p.* 90. *t.* 20.
Low grounds, near Hull bridge, and Grove-hill at Beverley.

intermedia - C. diſticha. *Hudſ. Lightf.*
— arenaria. *Leers, t.* 14. *f.* 2.
Wet paſtures, and meadows, frequent.
There ſeems to be more than one ſpecies included in this name.

diviſa - - *Tranſ. Linn. Soc. vol.* 2. *p.* 157. *t.* 19. *f.* 2.
In a meadow, called Derricots, near Hull.
I never met with it in any other place.

muricata - C. ſpicata. *Hudſ. Lightf.*
Woods. Paſtures. Meadows.
I have ſeen this, or one in the ſame way, on the drieſt ſandy land, in which ſituation the capſules do not divaricate near ſo much as when growing in more moiſt places.

vulpina - - Sides of ditches, under hedges, in woods.

teretiuſcula - *Tranſ. Linn. Soc. vol.* 2. *p.* 163. *t.* 19. *f.* 3.
Arram Car, near Beverley, abundantly.

paniculata - Sides of ditches. Marſhes. Woods.
Obſ. We have in the marſhes a variety of this, with a ſmall compact panicle, which never forms itſelf into large tufts, as the C. paniculata does. It probably may be a diſtinct ſpecies.

præcox - - C. montana. *Hudſ. Lightf.*
Dry paſtures, and heaths. Common.

filiformis - *Tranſ. Linn. Soc. vol.* 2. *p.* 172. *t.* 20. *f.* 5.

C. tomentosa. *Lightf.* -
In all the watery marshes about Beverley, very common.

Carex flava - - - Wet pastures. Bogs. Sides of rivulets.

extensa - - *Transf. Linn. Soc. v.* 2. *p.* 175. *t.* 21. *f.* 7.
Wet pastures, near Beverley.
I am not certain that this is the plant which Dr. Goodenough means.

fulva - - Wet pastures, and meadows, in various places. Near Beverley.
I have ventured to continue this, as the figure quoted by Dr. Goodenough in *Fl. Dan.* 1049 is a good representation of my plant, and it is certainly different from any of the varieties of the C. flava. It is also always a much weaker and smaller plant in all its parts than the C. distans.

distans - - Woods. Pastures. Meadows.

panicea - - Wet pastures. Meadows, and marshes.

sylvatica - - Woods, and hedges.

recurva - - *Leers, t.* 15. *f.* 3.
Heaths. Meadows, and pastures.

pallescens - *Leers, t.* 15. *f.* 4.
Woods. Pastures, and meadows.

limosa - - Bogs, near Terrington. Rare.

Pseudo-cyperus *Hudf. Lightf. Ger. em.* 29. *f.* 2.
In a place called Dumble pit, near Beverley; the only place I have seen it in, in the North.

Carex pilulifera - - *Hudſ. Lightf. Leers, t.* 16. *f.* 6.
Woods. Heaths, and paſtures.

cæſpitoſa - - *Tranſ. Linn. Soc. vol.* 2. *p.* 195. *t.* 21. *f.* 8.
In marſhes, and ſides of rivers, and ditches.

ſtricta - - *Tranſ. Linn. Soc. vol.* 2. *p.* 196. *t.* 21. *f.* 9.
C. cæſpitoſa. *Hudſ.*
Marſhes, and ſides of ditches.

riparia - - C. acuta. var. α. *Hudſ. Lightf.*
Banks of rivers. Wet meadows.

paludoſa - - C. acuta. *Fl. Lond.*
Sides of ditches, and rivers.

acuta - - C. gracilis. *Fl. Lond.*
Banks of rivers. Beverley.

veſicaria - - C. inflata. *Hudſ. Lightf.*
Leers, t. 16. *f.* 2. III.
Ditches, at Beverley. Hull. Cottingham.

ampullacea - C. veſicaria. *Hudſ. Lightf.*
Sides of rivers. Wet meadows, and marſhes. Frequent.

hirta - - *Hudſ. Lightf. Leers, t.* 16. *f.* 3.
Woods. Wet meadows, and paſtures.

POLYANDRIA.

Ceratophyllum demerſum ? *Hudſ.* 419. *With.* 440.
In a rivulet, near Harrowgate. I have not ſeen the fructification.

Myriophyllum ſpicatum *Hudſ.* 419. *With.* 389.
Ponds at Caſtle Howard, and Londeſbrough.

Myriophyllum verticillatum Ditches about Beverley.

DIOECIA DIANDRIA.

Salix triandra - - *Hudſ.* 425. *With.* 45.
Hedges. Oſieries. Banks of rivers.

pentandra - Sides of rivers. Rivulets. Ditches.
Near Beverley, and in moſt parts of the county.

vitellina - - In oſieries.

amygdalina - Hedges. Sides of ditches.

fragilis - - Sides of rivers, and ditches.

Helix - - River ſides.

purpurea - - *Linn. Hudſ.*
About Beverley.

This, and the S. Helix, are by ſome authors ſuppoſed to be one ſpecies, and they have named it S. monandra.

I have obſerved the following diſtinctions, in their native places of growth:

In the month of March, previous to their flowering, the bark of the young ſhoots of the S. purpurea is of a dark purple, and the ſcales of the buds are a fine red, (almoſt ſcarlet,) generally tipped with black, and before they drop off they turn wholly black; at the ſame time, the bark of the young ſhoots of the

 S. Helix

	S. Helix is of a yellowiſh brown, and the ſcales of the buds are always of a pale brown, or cheſnut colour.
	I have ſeen but few female plants of the S. purpurea; they ſeem to be rare.
Salix myrſinitis - -	On the ſlope of a high hill, between Kilnſay and Arncliffe. *Curtis.*
herbacea - -	Ingleborough, and other high mountains, in the North and Weſt Ridings.
reticulata - -	On the rocks on the uppermoſt part of Ingleborough, on the north ſide; and on a hill called Whern-ſide, over againſt Ingleborough, on the other ſide the ſubterraneous river. *R. Syn.*
repens - -	Heath. Several varieties of it.
fuſca - -	*Linn.* S. arenaria. *Lightf.* Near Beverley.
	I have one variety with ſtipulæ, and another without.
roſmarinifolia -	On the edge of a rivulet which runs into Semer-water, Wenſleydale. *Curtis.*
	Arram Car, near Beverley?
caprea - -	Woods. Hedges.
acuminata -	*Hoffm.* Sides of ditches. Hedges.
aurita - -	S. caprea. *β. Hudſ.* Woods, near Beverley.
cinerea - -	*With.* Woods, and hedges.
viminalis -	Oſieries. Sides of ditches.
alba - -	By rivers and ditches.

TETRAN-

TETRANDRIA.

Hippophae Rhamnoides *Hudſ.* 431. *With.* 204.
On the ſea-bank, between Whitby and Lyth. *R. Syn.*

Myrica Gale - - *Hudſ.* 432. *With.* 208.
Houghton-moor.

OCTANDRIA.

Rhodiola roſea - - *Hudſ.* 434. *With.* 389.
Rocks on Ingleborough Hill.

POLYGAMIA MONOECIA.

Atriplex laciniata - *Eng. Bot.* 165. *With.* 274.
Sea-ſhore, at Hornſea.

ſerrata - - *Hudſ.* 444. A. littoralis. *With.* 275.
Humber banks, at Hull.

littoralis - *Hudſ.*
Sea-ſide, at Hornſea.

CRYPTOGAMIA FILICES.

Oſmunda regalis - *Hudſ.* 449. *With.* 763.
In a plantation, belonging to Lord Loughborough, at Harrowgate. Near Ripley.
About Keighley. Mr. Knowlton.

Oſmunda Lunaria - β. *Hudſ.* 449.
By the ſide of the Lake at Hornſea.

crifpa - - *Hudſ.* 450. Pteris criſpa. *With.* 764.
Ingleborough Hill. Haworth, near Halifax. Mr. Knowlton.

Blechnum Spicant - *With.* 765. Oſmunda Spicant *Hudſ.* 450.
Woods, and heaths.

Pteris aquilina - - Every-where.

Achroſtichum ſeptentrionale *Hudſ.* 450. *With.* 764.
Ingleborough Hill. Mr. Tofield, in *Hudſ.*

Aſplenium Ceterach - *Hudſ.* 452. *With.* 767.
Limeſtone-rocks, near Malham Tain, in Craven. *R. Syn.* And found lately in the ſame place by Mr. Knowlton.

Trichomanes β. ramoſum. *Hudſ.*
Ingleborough Hill. Hornby Hills. Rare.

viride - *Hudſ.* 453. *With.* 768.
On Ingleborough, and near Malham.
On walls, and rocks, above Settle. Mr. Knowlton.

viride - var. 3. *With.* A. ramoſum. *Linn.*
Ingleborough, and on limeſtone rocks, in the neighbourhood of Settle and Ingleton. Rare.

lanceolatum *Hudſ.* 454. *With.* 770. *Engl. Bot.* 240.
On a wall in the village of Wharf. Bolton.

Polypodium Lonchitis *Hudſ.* 455. *With.* 773.
Near Bingley. *Hudſ. ed.* 1.

Poly-

Polypodium fragile - Rocky parts of the North and West Ridings. About Knaresborough and Harrowgate.

rhæticum *Hudſ.* 458. *With.* 780.
Near Fountain's Abbey. On rocks, about Knaresborough.

Trichomanes pyxidiferum *Hudſ.* 461. *R. Syn.* 127. *t.* 3. *f.* 3. 4.
In September 1782 I found this rare plant in Belbank wood, near Bingley, the place mentioned in *R. Syn.*; whether it be only a variety of the following, I leave to the deciſion of thoſe who may have frequent opportunities of examining it, in the places of its growth.

tunbridgenſe On the rock called Foal-foot, Ingleborough Hill. Bolton. This is the Hymenophyllum tunbridgenſe of Dr. Smith.

MUSCI.

Lycopodium alpinum *Hudſ.* 464. *With.* 759.
On the ſummit of Ingleborough, and other high hills in that part of the county.
About Keighley. Whitby. Mr. Knowlton.

Trentipohlia erecta - *Hoffm. Germ. Fl. v.* 2. *p.* 17. *t.* 14. *Fl. Dan.* 215.
I found this in a bog near Beverley, and could not gueſs what it was until I met with it figured in Hoffman.

 Phaſcum

Phaſcum cuſpidatum *Sibth. Oxon.* 273. *Schreb. t.* 1. *f.* 1. 2.
Woods, and dry banks. XII.—III.

curvicollum *Dickſ. f.* 2. *p.* 1. *With.* 786.
On the wolds, between Beverley and Market Weighton. III.

axillare - *Dickſ. f.* 1. *p.* 2. *t.* 1. *f.* 3. P. nitidum. *With. Hoffm.*
Sides of ditches, and in woods, at Beverley. X.—XII.

ſerratum - *Dickſ. f.* 1. *p.* 1. *t.* 1. *f.* 1. *With.* 785.—velutinum? *Hoffm. Schr. de Phaſ. t.* 2.?
In a wet paſture, called Swinemoor, at Beverley, and in arable lands among ſtubble. XII.—III.

muticum - *With.* 784. *Schreb. Phaſc. t.* 1. *f.* 11. 12. β. acaulon. *Hudſ.* 466. *Dill. t.* 32. *f.* 12.
Garden walks. Mud walls. Dry banks. XII.—III.

criſpum - caulefcens, foliis lanceolatis longè acuminatis, revoluto-contortis. *Hedw.* 1. *t.* 9. *Hoffm. Germ. Fl.* 20.
Sides of ditches, in Figham, at Beverley. III.
Obſ. I ſent ſpecimens of this to my friend Mr. Dickſon, who named it, and added, that it had not been found in Britain before.

Splachnum anguſtatum *Dickſ. f.* 2. *p.* 3. *With.* 792.
In a bog, near Cottingham. Rare. IV. V.

vaſculoſum *Hudſ.* 469. *With.* 791.
Moiſt mountains, and heaths. *Hudſ.*

Fontinalis alpina - *Dickſ. f.* 2. *p.* 2. *t.* 4. *f.* 1. *With.* 789.
Mountain rivulets, in the North and Weſt Ridings. This is F. minor in my other paper.

minor - *Hudſ.* 468. *With.* 788.
In rivulets, above Helmſley. Hornby Hills.

ſquamoſa - *Hudſ.* 467. *With.* 788.
Rivulets, in the Weſt Riding.

Mnium arcuatum - *Dickſ. f.* 3. *p.* 2. *With.* 803.
In the boggy part of Houghton-moor. In Greenfield, Saddleworth. *With.*

Polytrichum ſubrotundum, nanum, aloides, commune, piliferum - On heaths. Earthen walls. Dry banks.
I found the laſt, with quinquefid capſules, at Harrowgate.

ſtrictum, rubellum - Upon heaths.

urnigerum - Ingleborough Hill. Among the rocks on Hornby Hills.

alpinum - At Caſtle Howard. Ingleborough.

Orthotrichum criſpum *Hoffm. Germ. Fl.* 25. *Dill. t.* 55. *f.* 12.
anomalum — — — *f.* 9.
ſtriatum — — — *f.* 8.
affine *Hoffm. Germ. Fl. p.* 26.

Ortho-

Orthotrichum diaphanum *Schrad.*
On trunks of trees, and rocks.

Bryum apocarpum - var. 2. *With.* Hedwigia ciliata. *Hedw.* *Dill. t.* 32. *f.* 5.
On rocks, in the North and Weſt Ridings.

ſtrictum - - *Hoffm. Germ. Fl.* 36. β. purpureum. γ. *Hudſ.* *Dill. t.* 49. *f.* 52.
In bogs. III. IV.

aciculare - *Hudſ.* 479. Dicranium aciculare. *Swartz.* *Dill. t.* 46. *f.* 25.
On ſtones, in mountainous rivulets. At Harrowgate. VIII.—IX.

bipartitum - *Dickſ. f.* 2. *p.* 7. *With.* 835. *Dill. t.* 49. *f.* 50.
Walls, and ditch banks. II. III.

calcareum - *Dickſ. f.* 2. *p.* 8. *t.* 4. *f.* 3. *Engl. Bot.* 191. *With.* 812.
On chalk-ſtones, near Biſhop-Burton. Rare.

caneſcens - *With.* 825. Trichoſtomum caneſcens. *Hedw.* *Dill. t.* 47. *f.* 27. D. E. F.
On heaths. Harrowgate. Houghton-moor.

lanuginoſum - *Swartz. Hoffm. Germ. Fl.* 41. *Dill. t.* 47. *f.* 32.
On heaths.

capillaceum - *Dickſ. f.* 1. *p.* 4. *t.* 1. *f.* 6. *With.* 831. β. æſtivum. *Hudſ.*
Ingleborough Hill. VIII.

cuneifolium - *Dickſ. f.* 3. *p.* 7. *Dill. t.* 45. *f.* 15.
Earthen walls, and dry banks. XI. XII.

Bryum

Bryum curviroſtrum - - *Dickſ. f.* 2. *p.* 7. *Dill. t.* 48. *f.* 45.
Dry ſtony places, near Beverley. XII.—II.

barbatum - - *Curt.* *Dill. t.* 48. *f.* 48. *With.* 829.
Weſtwood, at Beverley. III.

flexuoſum - *Hudſ.* 484. *With.* 834. *Dill. t.* 47. *f.* 33.
On heaths very common, but not in fructification.

rigidum - - *Hudſ.* 477. *With.* 813. *Dill. t.* 49. *f.* 55.
Rocks, on Ingleborough. *Hudſ.*

fragile - - *Dickſ. f.* 3. *p.* 5. *Dill. t.* 47. *f.* 33. F. G.
Woods, and heaths. VII.

Heimii - - *Dickſ. f.* 2. *p.* 4. *With.* 815. *β.* truncatulum. *Linn.* et *Hudſ.* *Dill. t.* 45. *f.* 7. I. K.
Walls, and dry banks. XI.—III.

pellucidum - *Hudſ.* 481. Mnium pellucens. *With.* 802. *Dill. t.* 46. *f.* 23.
On large ſtones, by the ſide of a rivulet, north of Harrowgate. VIII.—X.

ovatum - - *Dickſ. f.* 2. *p.* 4.
Mud walls, and dry banks. XI. XII.

verticillatum - *Hudſ.* 485. *With.* 821. *Dill. t.* 47. *f.* 35.
On moiſt rocks, Yorkſhire. Dr. Richardſon.

polyphyllum - *Dickſ. f.* 3. *p.* 7. *Dill. t.* 48. *f.* 41.
Birmham rocks, near Ripley. VIII.

brevifolium - *Dickſ. f.* 2. *p.* 4. *Dill. t.* 47. *f.* 39.
Bogs, in Yorkſhire. *Dill.*

Bryum

Bryum virens - - *Dickſ. f.* 1. *p.* 4. *Dill. t.* 48. *f.* 43.
Dry banks. Sandy paſtures. XII.—III.
This is the B. viridulum in my former paper.

mucronulatum *Dickſ. f.* 3. *p.* 3. *With.* 817.
Sides of ditches, near Beverley. III. IV.
Obſ. The acuminated part of the Calyptra is frequently black.

lanceolatum - *Dickſ. f.* 3. *p.* 4. *With.* 824.
Mud-walls. Hedge-banks. I.—III.

fallax - - *Dickſ. f.* 3. *p.* 5. *With.* 833.
In Yorkſhire. *Dickſ.*

ventricoſum - *Dickſ. f.* 1. *p.* 4. B. triquetrum. *Hudſ.* 490. *Dill. t.* 51. *f.* 72.
Bogs on heaths. IV. V.

- γ. triquetrum. *Hudſ.* 491. Mnium nutans. *With.* 803. M. turbinatum. *Hoffm. Germ. Fl.* 49. *Dill. t.* 51. *f.* 74.
Bogs, and marſhy grounds.

bimum - - *Schreb.* M. bimum. *Hoffm. Germ. Fl.* 48.
β. B. triquetrum. *Hudſ. Dill. t.* 51. *f.* 73.
In bogs. IV. V.

crudum - - *Hudſ.* 491. *Dill. t.* 50. *f.* 70.
Woods, in the Eaſt and North Ridings. V. VI.

Hypnum trichomanoides *With.* 484. H. complanatum. β. *Hudſ. Dill. t.* 34. *f.* 8.
Leſkia trichomanoides. *Sibth. Fl. Oxon.* 303.
Trunks of trees. Beverley.

Hypnum ruſcifolium - *Dickſ. f.* 3. *p.* 10. *With.* 848. *Dill. t.* 38. *f.* 31.
Banks of rivers. On ſtones in rivulets. IX. X.

lutefcens - *Hoffm. Germ. Fl.* 75. *Dill. t.* 42. *f.* 60. H. luteſcens. *Hudſ.* ?
Dry ſtony banks, between Beverley and Newbold. III. IV.

caſſubicum - *Dickſ. f.* 3. *p.* 10. *With.* 849.
In woods, and hedge-banks, near Beverley.

intricatum - *Eng. Bot.* 202. *With.* 849.
Roots of trees, near Beverley.

fluitans - - *With.* 851. *Dill. t.* 38. *f.* 33.
In the marſhes, near Beverley.
I have not ſeen it in fructification.

compreſſum - *Hudſ.* 498. *Dill. t.* 36. *f.* 22.
Trunks of trees. II. III.

murale - - *Dickſ. f.* 3. *p.* 10. H. myoſuroides. γ. *Hudſ. Dill. t.* 41. *f.* 52.
Upon the old walls, at Riſby, near Beverley.

molle - - *Dickſ. f.* 2. *p.* 11. *t.* 5. *f.* 8. *With.* 862.
Rocks, at Crambe Beck Bridge, between York and Malton.

filiforme - *Hudſ.* 497. *Dill. t.* 42. *f.* 62. H. filifolium. *With.*
Trunks of trees. XII.—III.

illecebrum ? - *Hudſ.* 504. *With.* 862. *Dill. t.* 40. *f.* 46.
On the Wolds, in ſtony places. II. III.

Hypnum atro-virens - *Dickſ. f.* 2. *p.* 10. *Dill. t.* 43. *f.* 67.
Shady woods in the North Riding. IX.—XII.

myoſuron - *With.* 865. β. myoſuroides. *Hudſ. Dill. t.* 41. *f.* 50.
Roots of trees, in woods.

ſtriatum - *With.* 850. γ. rutabulum. *Hudſ. Dill. t.* 38. *f.* 30.
Roots of trees. Under hedges. XII.—II.

prolixum - *Dickſ. f.* 2. *p.* 13. *Dill. t.* 85. *f.* 20.
β. Hypnum riparium. *Weber.*
On ſtones, in mountainous rivulets, in the North Riding. Mill-dams.

paludoſum - ſurculis confertis decumbentibus, ramis ſimpliciuſculis erectis teretibus acutis; foliis ovato-acutis ſubſecundis; capſulis cylindraceis obliquis. *Swartz.*
Leſkia paludoſa. *Hedw. et Swartz.*
About the roots of willows, in the marſhes near Beverley. XI. XII.

muticum - - ſurculis plano-pinnatis, apice attenuatis, foliis ovato-lanceolatis appreſſis enerviis.
β. purum. *Hudſ. Dill. t.* 40. *f.* 47.
H. Schreberi. *Swartz. Act. Stockh.* 1795.
H. compreſſum. *Hoffm.* but not of *Linn.*
On heaths.

lacunoſum - caule et ſurculis incraſſatis, foliis ovato-acuminatis incurvatis ſecundis enerviis

S lacunoſis.

lacunoſis. *Hoffm. Germ. Fl.* 63. *Dill. t.* 37. *f.* 24. c.
Moleſcroft-car, near Beverley.

ALGÆ.

Jungermannia cochleariformis *With.* 876. J. purpurea. *Lightf.* Mnium Jungermannia. *Linn. Dill. t.* 69. *f.* 1.
Moiſt heaths——rarely found in fructification. I once found it in that ſtate near Harrowgate. VIII. IX.

ventricoſa - *Dickſ. f.* 2. *p.* 14. *Dill. t.* 70. *f.* 14.
Buſhy paſtures, near Beverley. IV.

ovata - - - *Dickſ. f.* 3. *p.* 11. *t.* 8. *f.* 6.
Houghton-moor. III. IV.

exciſa - - - *Dickſ. f.* 3. *p.* 11. *t.* 8. *f.* 7.
Woods at Beverley. IV.

pulcherrima - *Dickſ. f.* 1. *p.* 7. *Dill. t.* 69. *f.* 3. *Hoffm. Germ. Fl.* 83.
Heaths, at Harrowgate; and Houghton-moor, where I once found it in fructification. VIII.

Tomentella - *Hoffm. Germ. Fl.* 83.
This is the J. ciliaris. *Hudſ.* and in my former paper.

ſcalaris - - *With.* 870. J. trichomanes. *Dickſ. f.* 3. *p.* 10. *t.* 8. *f.* 5. *Dill. t.* 31.

 f. 5.

f. 5. Mnium trichomanes. *Linn.* *Hudſ.* and in my laſt paper. Shady woods.

Jungermannia minuta - - - *Dickſ. f.* 2. *p.* 13. *Dill. t.* 69. *f.* 2. Woods, near Richmond, creeping on ſome ſpecies of Hypnum.

viticuloſa - - *Hudſ.* 509. *With.* 873. *Dill. t.* 69. *f.* 7. On ſtones, in rivulets, at Hornby-Hills and Malham Cove.

multiflora? - *Hudſ.* 510. *Dill. t.* 69. *f.* 4. Houghton-moor. I have not found it in fructification.

quinquedentata *Linn. Hudſ.* 509. *With.* 871. *Dill. t.* 71. *f.* 23. In moiſt ſhady woods. Dr. Richardſon. *R. Syn.*

julacea - - - *Hudſ.* 516. *With.* 881. *Dill. t.* 73. *f.* 38. Rocks in the Weſt Riding. Birmham Rocks.

rupeſtris - - *Hudſ.* 516. *With.* 882. *Dill. t.* 73. *f.* 40. Birmham Rocks.

alpina - - - *Hudſ.* 517. *With.* 882. *Dill. t.* 73. *f.* 39. Andreæa petrophila. *Hoffm. Germ. Fl.* 80. On Ingleborough and Birmham Rocks.

Junger-

Jungermannia curvifolia - - *Dickſ. f.* 2. *p.* 15. *t.* 5. *f.* 7.
Birmham Rocks.

concinnata - - *Lightf.* 786. *With.* 881.
Birmham-Rocks.

trichophylla - - *Hudſ.* 516. *With.* 882. *Dill. t.* 73. *f.* 37.
Heaths, near North Binley. Dr. Richardſon.

ſinuata - - *With.* 869. *Dill. t.* 74. *f.* 44.
Sides of ditches, near Beverley. Bell Bank, near Bingley. *Dill.* Middleton Wood, near Leeds. Mr. Wood, in *With.* III. IV.

tomentoſa - - acaulis, frondibus ramoſo-furcatis linearibus, obtuſis, tomentoſis. *Hoffm. Germ. Fl.* 91.
On rocks, in the North and Weſt Ridings.

bicornis - - fronde pinnata, foliolis alternis, bicuſpidatis; cuſpidibus polleniferis. *Fl. Dan. t.* 888.
On the Wolds, between Beverley and Market-Weighton.

Blaſia puſilla - - - - - *Hudſ.* 518. *With.* 886. *Dill. t.* 31. *f.* 7.
Near Halifax. Mr. Bolton.

Targionia ſphærocarpos - - *Dickſ. f.* 1. *p.* 8. *Dill. t.* 78. *f.* 17.
In fallow fields, near Beverley. X. XI.

Targionia

Targionia hypophylla *Hudſ.* 519. *Dill. t.* 78. *f.* 9. *Eng. Bot. t.* 287.
Near Keighley. Mr. Knowlton. Moſſy places in Yorkſhire. Dr. Richardſon.

Riccia natans - - *Eng. Bot.* 252. *Hudſ.* 522. *With.* 887. *Dill. t.* 78. *f.* 18.
In ditches, and ponds, near Beverley.

fluitans - - *Eng. Bot.* 251. *Hudſ.* 522. *Dill. t.* 74. *f.* 47.
With the above ſpecies, about Beverley.

Lichen albus - - *With.* 2. Byſſus lactea. *Linn.*
Trunks of trees. Decayed moſſes.

incanus - - On the ground. Trunks of trees.

cinereus - - On rocks.

antiquitatis - On rocks, large ſtones, and walls.

flavus - - Trunks of trees, and walls.

botryoides - Bark of trees, and walls.

hebraicus - - } *Sibth. Fl. Oxon.* 317.
pulicaris - - }
Bark of trees.

roſaceus - - *Fl. Dan.*
Bark of trees.

atro-albus - *With.* 5.
On rocks.

immerſus - - *Eng. Bot.* 193. *With.* 6. *Relh. Fl. Cant.* 1026.
On chalk-ſtones, upon the Wolds.

ſanguinarius - *Eng. Bot.* 155. *With.* 6.
Trunks of trees, and rocks.

Lichen

Lichen graniformis - *Dickſ. f.* 1. *p.* 10.
On old pales.

æruginoſus - *Sibth. Fl. Oxon.* n. 880.
Trunks of trees, near Beverley. Rare.

muſcorum - *Relh. Fl. Cant.* n. 848. *With.* 7.
Upon moſs, on heaths, in the North Riding.

confluens - - *Dickſ. f.* 1. *p.* 9. *With.* 8.
On rocks, and walls, in the Weſt Riding.

niger - - - *With.* 10.
Rocks and old pales.

fuſco-ater - - *With.* 11.
On walls, and ſtones, near Harrowgate.

corneus - - *With.* 20. *t.* 31. *f.* 3.
On the trunks of oaks, near Beverley.

querneus - - *Dickſ. f.* 1. *p.* 9. *t.* 2. *f.* 3.
Trunks of oaks, in the Eaſt Riding.

geographicus - *Eng. Bot.* 245. *With.* 12. *Dill. t.* 18. *f.* 5.
Rocks, in the North and Weſt Ridings.

ſulphureus - *Dickſ. f.* 2. *p.* 17. *With.* 12.
Rocks, and walls.

atro-virens - *With.* 13.
On rocks, near Harrowgate.

rupicola - - *With.* 13.
Limeſtone rocks, and ſtones, in the Weſt Riding.

vernalis - - *With.* 14. L. ferrugineus. *Hudſ. Dill. t.* 18. *f.* 4.
Bark of trees.

Lichen

Lichen Bæomyces - - *Eng. Bot.* 374. L. ericetorum, in my former paper.
On heaths.

ericetorum - *Eng. Bot.* 372. *β. Lightf.* L. icmadophila. *With.* 15. L. elveloides. *Weber.*
On heaths. Houghton-moor.

flavo-rubeſcens *With.* 15. L. aurantiacus. *Lightf. Fl. Scot.* 810.
Bark of trees. Pales. Walls.

pertuſus - - *With.* 15. *Hudſ.* 525. *Dill. t.* 18. *f.* 9.
Rocks, and trunks of trees.

ventoſus - - *With.* 16.
Rocks, in the Weſt Riding. Near Harrowgate.

ſphærocephalus *Eng. Bot.* 414. *Dill. t.* 14. *f.* 3.
Trunks of trees, at Londeſborough; ſhewn me by Mr. Knowlton.

corallinus - *With.* 16.
Rocks, in the North and Weſt Ridings.

crenulatus - *Dickſ. f.* 3. *p.* 15. *t.* 9. *f.* 1.
Rocks, in Yorkſhire. *Dickſon.*

candicans - *Dickſ. f.* 3. *p.* 15. *t.* 9. *f.* 5.
Rocks, in Yorkſhire. *Dickſon.*

ſcrupoſus - - *Eng. Bot.* 266. *With.* 19. *Dill. t.* 18. *f.* 15. B.
On walls, dry banks, and heaths.

pulverulentus *Sibth. Oxon.* n. 893. *Dill. t.* 24. *f.* 71.
Trunks of trees.

tiliaceus - - *Dickſ. f.* 3. *p.* 16. *Hoffm. Germ. Fl.* 149.
On trees, near Walkington.

Lichen

Lichen olivaceus - - var. nitidus. *Sibth. Oxon. Dill. t.* 24. *f.* 78.
Trunks of trees.

pulverulentus *β. Weber.*
Trunks of trees, near Beverley. Rare.

fruſtuloſus - *Dickſ. f.* 3. *p.* 13. *t.* 8. *f.* 10. *With.* 19.
Rocks, in Yorkſhire. *Dickſon.*

pallidus - - *With.* 21.
Trunks of trees. Old paling. Walls.

frigidus - - *With.* 22.
On moſs, and heath, upon Houghton-moor.

marmoreus - *With.* 22.
On the bark of trees, and on the bare ground, covered with decayed moſs, in Yorkſhire. *Withering.*

cerinus - - *Dickſ. f.* 3. *p.* 14. *With.* 24.
On old paling, and trunks of trees.

byſſinus - - *With.* 25.
Trunks of trees, and ſtones.

flaveſcens - - *Hudſ.* 528. L. flavicans. *With.* 25. *Dill. t.* 18. *f.* 18. A. C.
On walls.

rimoſus - - *Dickſ. f.* 1. *p.* 12. *With.* 25.
Rocks, and ſtones, in Yorkſhire. *Dickſ.*

cæſius - - *Dickſ. f.* 2. *p.* 19. *t.* 6. *f.* 6.
On ſtones, in the Weſt Riding.

pruinatus - *Dickſ. f.* 3. *p.* 15. *t.* 9. *f.* 4. *With.* 20.
On ſtones, in the mountainous parts of the Weſt Riding. Near Harrowgate.

Lichen luridus - - *Dickſ. f.* 2. *p.* 20. *Dill. t.* 30. *f.* 134.
Rocks, in the North Riding. Rare.

multifidus - *Dickſ. f.* 3. *p.* 16. *t.* 9. *f.* 7.
On ſtones, in the Weſt Riding. Near Harrowgate.

cartilagineus - *With.* 29. L. craſſus. *Hudſ.* 530. *Dill. t.* 24. *f.* 74.
About Malham. *Hudſ.* On rocks, near Harrowgate.

muralis - - *Dickſ. f.* 1. *p.* 11. *With.* 29.
Rocks and walls. Not common in the North.

albeſcens - - *Hudſ.* 529.
Trunks of trees.

Pſora - - - *With.* 26.
On ſtones. Rocks at Harrowgate.

ſquamatus - *Dickſ. f.* 2. *p.* 20. *Dill. t.* 30. *f.* 135.
On a heath, at Harrowgate. Rare.

centrifugus - *Hudſ.* 530. *With.* 32. *Dill. t.* 24. *f.* 75.
Rocks, in the Weſt Riding.

marginalis - *Hudſ.* 534. *With.* 34. *Dill. t.* 19. *f.* 25.
On walls, near Settle. Dr. Smith, in *Withering.*

foliaceus - - *With.* 35. *Hudſ. edit.* 1. L. alcicornis. *Lightſ.* 872. *Dill. t.* 14. *f.* 12.
Heaths. Houghton-moor.

filiformis - *Hudſ.* 552. *With.* 38. *Dill. t.* 14. *f.* 10.
Roots of trees, in woods. Heaths. On walls.

Lichen

Lichen exiguus - - *Hudſ.* 552. *Dill. t.* 14. *f.* 11. C. exilis. *Hoffm. Germ. Fl.* 121.
On walls. Roots of trees. Heaths.

tuberculatus - *Relh. Fl. Cant.* 435. *Dill. t.* 14. *f.* 6. C. K. L.

Cladonia tuberculoſa. *Hoff. Germ. Fl.* 122.
Heaths.

Cladonia criſtata. *Hoffm. Germ. Fl.* 124. *Dill. t.* 14. *f.* 9.
Heaths.

Cladonia prolifera. *Hoffm. Germ. Fl.* 122.
Heaths. Roots of trees.

Cladonia marginalis. *Hoffm. Germ. Fl.* 123. *Dill. t.* 14. *f.* 6. I. M.
Heaths. Walls.

Cladonia irregularis. *Hoffm. Germ. Fl.* 125. *Dill. t.* 15. *f.* 20.
Roots of trees, and heaths.

Cladonia coronata. *Hoffm. Germ. Fl.* 25. *Dill. t.* 15. *f.* 19. C.
Woods, and heaths.

radiatus - - *With.* 38. L. gracilis. *Hudſ.* 555. *Dill. t.* 15. *f.* 16.

Cladonia radiata. *Hoffm. Germ. Fl.* 120.
Barren heaths.

Cladonia Fibula. *Hoffm. Germ. Fl.* 127. *Dill. t.* 15. *f.* 15.
Barren ſtony ground, and heaths.

Lichen paſchalis - - *Hudſ.* 558. *Eng. Bot.* 282. *With.* 44. *Dill.* *t.* 17. *f.* 33.
Rocks, in the Weſt Riding.

fragilis - - *Hudſ.* 558. *Eng. Bot.* 114. *With.* 41. *Dill.* *t.* 17. *f.* 34.
Rocks, in the North and Weſt Ridings. Near Harrowgate.

ſpinoſus - - *Hudſ.* 556. *With.* 45. *Dill.* *t.* 16. *f.* 25.
On heaths. Houghton-moor. Harrowgate.

furcatus - - *Hudſ.* 556. *With.* 45. *Dill.* *t.* 16. *f.* 27.
Heaths. Dry banks. Earthen walls.

uncialis - - *β. Hudſ.* 555. *Dill.* *t.* 16. *f.* 21. B.
Cladonia biuncialis. *Hoffm. Germ. Fl.* 116.
Heaths. Houghton-moor.

Cladonia uncinata. *Hoffm. Germ. Fl.* 116. *Dill.* *t.* 16. *f.* 21. A.
Heaths.

jubatus - - *Hudſ.* 561. *With.* 46. *Dill.* *t.* 12. *f.* 7.
Uſnea jubata. *Hoffm. Germ. Fl.* 134.
On rocks, and trunks of old oaks, in the North and Weſt Ridings.

chalybeiformis *Linn.* *With.* 47. *β.* jubatus. *Hudſ.* 561.
Uſnea chalybeiformis. *Hoffm. Germ. Fl.* 135. *Dill.* *t.* 13. *f.* 10.
Rocks. Old paling. Trunks of trees, with the laſt ſpecies.

Lichen lanatus - - *Hudſ.* 562. *With.* 47. *Dill. t.* 13. *f.* 8.
Rocks, in the Weſt Riding. At Harrowgate.

prunaſtri - - *Dill. t.* 21. *f.* 55. B. G. I. Lobaria populina. *Hoffm. Germ. Fl.* 140.

On rocks, trees, and old pales, every where.

Lichenoides lacunoſum lacerum, latius et congeſtius. *Dill. t.* 27. *f.* 57. A.B.C.D.
On black thorn. Rare.

tenellus - - *With.* 56. β. ciliaris. *Hudſ.* 538. *Dill. t.* 20. *f.* 46.

Branches of trees, particularly the black thorn.

læte-virens - *Lightf.* 852. *With.* 58. L. herbaceus. *Hudſ.* 544. *Dill. t.* 25. *f.* 98.
In Yorkſhire. *Hudſon.*

plumbeus - - *Lightf.* 826. *With.* 60. L. cæruleſcens. *Hudſ.* 531.

On rocks, in the North and Weſt Ridings. Near Bradford. *Hudſon.*

concolor - - *Dickſ. f.* 3. *p.* 18. *t.* 9. *f.* 8. *With.* 62.
Trunks of trees. Beverley. Londeſborough.

puſtulatus - *Hudſ.* 549. *With.* 64. *Dill. t.* 30. *f.* 131.
Near Halifax. Bolton, in *Hudſon.*

polyrhizos - *With.* 64. L. velleus. *Hudſ.* 550.
Ingleborough Hill. Rare.

polyphyllus - *Hudſ.* 551. *With.* 65. *Dill. t.* 30. *f.* 129.
Rocks, near Harrowgate.

Lichen

Lichen ſaccatus - - *Hudſ.* 548. *With.* 67. *Dill. t.* 30. *f.* 121.
On rocks, and dry banks, in many places, in the North and Weſt Ridings.
About the mouth of Yordas-cave, near Ingleborough Hill. Dr. Smith, in *Withering.* Near Beverley. Rare.

polydactylos - *With.* 69. *γ.* caninus. *Hudſ.* 547. *Dill. t.* 28. *f.* 107.
Heaths. Roots of trees.
var. 2. *With.* *δ.* caninus. *Hudſ.* *Dill. t.* 28. *f.* 108.
On Rumble's mear (moor) near Helwick. *Dill.* and *Hudſon.*

rufeſcens - - *With.* 70. *β.* caninus. *Hudſ.* *Dill. t.* 28. *f.* 109.
Peltigera rufeſcens. *Hoffm. Germ. Fl.* 107.
Woods. Heaths. Roots of trees.

venoſus - - *Hudſ.* 546. *With.* 69. *Dill. t.* 28. *f.* 109.
In rocky places, north of Helmſley. Rare.

aphtoſus - - *Hudſ.* 547. *With.* 70. *Dill. t.* 28. *f.* 106.
Ingleborough Hill, and other parts of the county. *Hudſon.*

tremelloides - *γ.* *Lightf.* 842. *Dill. t.* 19. *f.* 34. *With.* var. 3.
In moſſy and ſtony paſtures.
δ. *Lightf.* *Dill. t.* 19. *f.* 35. *With.* var. 4.
Among moſs, in paſtures, at Beverley.

cochleatus - - *Dickſ. f.* 1. *p.* 13. *t.* 2. *f.* 9. *With.* 74.
Collema auriculatum. *Hoffm. Germ. Fl.* 98.

On

On large ſtones among moſs, by the ſide of a rivulet, north of Harrowgate.
In Yorkſhire. Curtis, in *Withering.*

Lichen nigreſcens - *Hudſ.* 537. *With.* 74. L. veſpertilis. *Lightf.* 840. *Dill. t.* 19. *f.* 20.
Trunks of old trees, particularly the aſh.
In ſtony places among moſs. Rarely found with ſcutella.

criſtatus - - *Hudſ.* 535. *With.* 75. *Dill. t.* 19. *f.* 26.
In moiſt ſhady ſituations, among moſs.

palmatus - - *With.* 74. *Dill. t.* 29. *f.* 30.
Among moſs, in woods where there is but little graſs. Old gravel walks.

criſpus - - *Hudſ.* 535. *With.* 76. *Dill. t.* 19. *f.* 23.
Shady ſituations, where the earth is but thinly covered with graſs, and moſs.

fluviatilis - *Hudſ.* 536. *With.* 77. *Dill. t.* 19. *f.* 28.
On ſtones in the rivulet that iſſues from Malham Cove. I have not found it in fructification.

IX. *A Continuation of the Hiſtory of Tipula Tritici, in a Letter to Thomas Marſham, Eſq. Tr. L. S. by the Rev. William Kirby, F. L. S.*

Read February 5, 1799.

MY DEAR FRIEND, *Barham, December* 1798.

AFTER all the pains we took laſt year to inveſtigate the hiſtory of the Wheat Inſect, we were obliged to leave it in ſome meaſure incomplete. This aroſe from our beginning our obſervations too late in the ſeaſon, after the parent fly had diſappeared. Determined to watch its progreſs this year from the firſt appearance of the ear, my ſucceſs, in moſt reſpects, has been anſwerable to my expectations. I have not indeed yet been able to aſcertain the male of our *Tipula*; but to make ſome amends for this diſappointment, I have had an opportunity of obſerving all the motions of the female, and beſides have diſcovered two new ſpecies of *Ichneumon*, which, in conjunction with that known before, and deſcribed in the laſt volume of the Linnean Society's Tranſactions (*a*), under the name of *Ichneumon Tipulæ*, ſeem to be intruſted with the important office of reſtraining within due limits the numbers of that very deſtructive little animal.

Without further preface, I ſhall now proceed to connect and put into form the different memoranda which I have by me on this ſubject, having adhered faithfully to the Linnean maxim, *Nulla dies ſine*

(*a*) Vol. iv. p. 232.

linea,

linea, and always taking my pencil and memorandum-book with me when I went into the fields to make my obſervations.

Previous to the ſeaſon when the ear begins to emerge from the *folium vaginans* (*b*), I have, as opportunities of examining fir plantations occurred, been upon the watch for De Geer's *Tipula Pini* (*c*); but not being ſo ſucceſsful as to meet with that inſect, I cannot aſcertain how nearly it may be related to its *congener* of the wheat. I was careful alſo, at the ſame time, to inſpect the plants that were in bloſſom in the borders of the wheat fields, in hopes of finding (*copulâ connexos*) the two ſexes of *Tipula Tritici*, but with no better ſucceſs.

It is to be obſerved that I had uſually choſen the forenoon for making my inquiries. It chanced that on the third of June laſt I had occaſion to paſs through a field planted with wheat, in the evening, and, to my great ſurpriſe and ſatisfaction, my attention was immediately arreſted by an innumerable hoſt of our *Tipulæ* flying about in all directions; and from that day to the latter end of the ſame month theſe inſects were always to be met with in the wheat fields. They were ſeldom to be ſeen much before ſeven o'clock; at eight the field appeared to ſwarm with them, at which hour they were all buſily engaged in laying their eggs; and about nine they generally diſappeared: they were indeed ſo extremely numerous, that if each of them were to lay its eggs in a different floret, and thoſe eggs were permitted to produce larvæ, I think, upon a moderate calculation, more than half of the grain would be deſtroyed. I have no-

(*b*) I was ſtrongly tempted to introduce two or three new words into this Paper, viz. *evaginate* and *evagination*, to expreſs without a periphraſis the emerging of the ear from the *folium vaginans*, and *oviposition* for the laying of eggs, from the Latin phraſe *ova ponere*; but leſt this liberty ſhould wear the appearance of affectation, I refrained from it.

(*c*) *Linn. Tranſ.* vol. iv. p. 228.

ticed twelve at one time depofiting their eggs in the fame ear. It is remarkable that amongft the myriads that I have feen of the female, I fhould not have obferved one which I could take for the male: indeed, towards the latter end of the month, (24th,) I took two or three fpecimens, which, except that they had black bodies and were fmaller, appeared exactly fimilar to our *Tipula*; but as neither their antennæ are hairy, nor their wings fpotted, as was the cafe with the fpecimen you received from Mr. Markwick, they can fcarcely be the male. Indeed the appearance of the male, inftead of being later than that of the female, ought to be as early or earlier, in order that they may be in readinefs to perform the work of impregnation previous to the feafon in which the females lay their eggs, which begins, at leaft it did this year, with the month of June. Hence I fuppofe that each fex is difclofed from the pupa in the genial month of May, when, to ufe the poetical language of Scopoli upon another occafion, "*nuptias inftituunt, de loco in locum continuò volitantes, zephyro plaudente choreis* (*d*)."

Although thefe infects are fo numerous in the evening, yet in the morning not a fingle one is to be feen upon the wing: they do not however then quit the field which is the fcene of their employment; for, upon fhaking the ftalks of the wheat, or otherwife difturbing them, they will fly about near the ground in great numbers. I found their ftation of repofe to be upon the lower part of the culm, with their heads upwards.

It is very entertaining to obferve the method to which thefe infects have recourfe in order to depofit their eggs in a fituation where the larvæ may foon arrive at their food: when engaged in this employment they are not foon difturbed; which circumftance affords the obferver an excellent opportunity of examination. As I hinted

(*d*) *Ent. Carniol.* n. 801, ubi de *Ape fabulosâ.*

before,

before, a number may be feen at the fame time upon one ear: they place themfelves in fuch a pofition that their *anus* ftands nearly at right angles with the margin of the glume of that floret which they mean to pierce. But how are they to introduce their eggs within the floret, for they depofit them between the exterior and interior valvules of the corolla? To look at them when they are not engaged in this employment, their *anus* appears to be furnifhed with no inftrument adapted to fo nice an operation; but upon preffure it exerts (*e*) a long retractile tube or *vagina* (*f*), which unfheaths an *aculeus* (*g*) (if I may fo term it) as fine as a hair and very long. This *aculeus* it introduces into the floret, and there depofits its eggs, which it ufually places upon the interior valvule of the corolla, juft above the ftigmata. After fhe has done laying her eggs, the infect withdraws her *aculeus* with great caution and deliberation: yet it fometimes happens that fhe is unable to effect this; in which cafe fhe is detained a prifoner until fome enemy devour her. In this fituation I have found them more than once in my morning walks. I was very defirous of feeing the eggs pafs through the *vagina*, but my firft attempts were unfuccefsful: at length I was gratified with this pleafing fpectacle. I gathered an ear upon which fome of our *Tipulæ* were bufy, and held it fo as to let a fun beam fall upon one of them, examining its operations under the three glaffes of a pocket microfcope: I could then very diftinctly perceive the eggs (*h*) paffing one after another, like minute air bubbles, through the *vagina*, the *aculeus* being wholly inferted into the floret. I examined this procefs for full ten minutes, before the patient little animal difengaged itfelf; and at laft it was through my violence that fhe difcontinued her employment and flew away.

(*e*) For this fenfe of the word *exert*, fee Johnfon's Dict. Nos. iv. v.

(*f*) Tab. iv. fig. 2. a. (*g*) Fig. 2. b. (*h*) Fig. 2. c.

On the feventh of June, upon opening a floret, I difcovered a fmall patch of eggs; they were oblong (*i*), tranfparent, and of a pale buff colour. I afterwards found feveral of thefe little patches, containing from a fingle egg only, to more than twenty. On the feventeenth I found, for the firft time, a larva newly hatched: it adhered to the lower end of one of the anthers (*k*), and was perfectly tranfparent and colourlefs; from which circumftance I conjecture, that it had taken no food. I afterwards detected two more in a fimilar fituation, one of which had become ftraw-coloured from the contrary caufe. In another floret, upon the fame day, I found many with their heads immerfed in the woolly fummit of the germen: fome were in the interior valvule of the corolla; others appeared to be bufy upon the plumofe ftigmata, upon which I did not obferve that any pollen had been difcharged from the anthers. Upon the twenty-fecond I obferved that the larvæ were ufually in the fituation reprefented in the accurate drawing engraved in the third volume of the Linnean Society's Tranfactions (*l*). All circumftances confidered, it feems to me moft probable, that thefe animals do not feed upon the pollen before it is difcharged from the anthers (*m*); yet one would think that in this cafe fufficient muft efcape them to fertilize the germen. How they prevent this I can but conjecture; as their heads are often immerfed in the ftigmata, and in the down obfervable upon the top of the germen, it is poffible they may occafion an obftruction in thofe fine ducts through which the fertilizing principle paffes down into the grain; or they may confume that fpermatic moifture upon the ftigma, without the aid of which the pollen cannot perform its office. On the twenty-ninth the parent *Tipulæ* had all difappeared, and foon after this period my inveftigations were ftopped by illnefs;

(*i*) Tab. iv. fig. 2. d. (*k*) Fig. 2. e. (*l*) Tab. xxii. fig. 10.

(*m*) Except perhaps when they are newly hatched.

but

but as I had brought them down ſo far as to connect them with thoſe made laſt year (*n*), this interruption was of leſs conſequence.

Before I take leave of this part of my ſubject, and give ſome account of the *Ichneumons* mentioned above, I muſt obſerve that the female of *Tipula Tritici* approaches very near to the female of one deſcribed by Geoffroy (*o*), which Fourcroy and Villars after him have called *Tipula immaculata*. His definition of that inſect, "*atra alis niveis*," and his deſcription in French, anſwer exactly to a minute black *Tipula*, which I find common upon the wheat, remarkable for its beautiful plumoſe antennæ (*p*). The female, he obſerves, is very different from the male, and it is neceſſary to have ſeen them copulating, not to make of it another ſpecies. It is ſhort, thick, yellow, with black eyes (*q*). He ſpeaks of his inſect as common in gardens, a ſituation in which I have never found *Tipula Tritici*. This deſcription certainly approaches very near to our female, yet the colour of that is deep orange, and not yellow: beſides, he makes no mention of the beautiful priſmatic hues which adorn the wings. The black male, mentioned above, diſappears at the ſame time with our female of the wheat, but it agrees in no reſpect with the ſpecimen you received from Mr. Markwick: beſides, I found another black one, which appeared to me to be its female.

I ſhall now proceed to give you ſome further account of the inſects which prey upon *Tipula Tritici*. I have reaſon to believe, as I

(*n*) *Linn. Tranſ.* iv. p. 230. (*o*) *Hiſt. ab. des Inſ.* ii. p. 567. n. 26.

(*p*) Le mâle de cette petite eſpéce eſt allongé comme les précédens, avec le ventre mince et en filet. Sa couleur eſt partout d'un noir matte. Ses antennes forment de beaux plumets. Ses aîles ſont d'un blanc laiteux, qui ſe fait d'autant plus remarquer, que ſon corps eſt fort noir.

(*q*) La femelle eſt très différente, & il faut les avoir vû accouplés enſemble pour n'en pas faire une autre eſpéce. Elle eſt courte, groſſe, de couleur jaune, avec les yeux noirs. On trouve cette Tipule partout dans les boſquets des jardins.

hinted

hinted before, that there are not lefs than three *Ichneumons* attached to it. If Providence for wife ends has created fo deftructive an infect, it has been no lefs attentive to prevent it from becoming too numerous, by making it the food of fo many other infects.

Upon the feventh of June I obferved a very minute *Ichneumon* exceedingly bufy upon the ears of wheat, which at firft I took for *Ichneumon Tipulæ* (*r*); but upon a clofer examination I found it to be a fpecies entirely diftinct (*s*), as will appear when I come to defcribe it. As foon as I was convinced of this, and obferved that it pierced the florets at a time when no larvæ had made their appearance, I conjectured that it muft lay its eggs in the eggs of the *Tipula*. How far this conjecture was well or ill founded muft be determined by future obfervations, as I do not think I have collected facts fufficient to decide the queftion. This infect is furnifhed with an *aculeus* three or four times its own length (*t*), which is finer than a hair and nearly as flexile: this is commonly concealed within the abdomen, but when the animal is engaged in laying its eggs it is exerted: one day it gave me a full opportunity of examining this procefs. It inferts its *aculeus* between the valvules of the corolla near the top of the floret; its antennæ are then nearly doubled and motionlefs, its thorax is elevated, and its head and abdomen depreffed: the latter, when it withdraws the *aculeus*, is moved frequently from fide to fide before it can extricate it. This infect has allowed me to examine its operations under a lens for fix or feven minutes: upon opening the floret into which it had introduced its *aculeus*, I could find neither egg nor larva of the *Tipula*; but, upon examining it very clofely under three glaffes, I difcovered, fcattered over one of the valvules of the corolla, a number of globular eggs

(*r*) *Linn. Tranf.* iv. p. 226. Tab. iv. fig. 8. (*s*) Fig. 4. (*t*) Fig. 5. a.

extremely minute (*v*), evidently not thoſe of that inſect. It is poſſible that there were in this floret eggs of the latter, which might be deſtroyed upon opening it, or eſcape my obſervation. At other times I have found eggs of *Tipula Tritici*, and once ſome larvæ, in florets upon which I had obſerved this *Ichneumon* buſy. If we reaſon from analogy, and the general habits of the genus *Ichneumon*, the eggs of this inſect ought to be depoſited in ſome other inſect in one of its ſtates; but, in the inſtance above mentioned, it ſeems only to have been attentive to ſcatter them in ſuch a ſituation as might lead them when hatched to their proper food. From the time in which it firſt makes its appearance, ten days before the hatching of the firſt larvæ, I am inclined to adopt my original conjecture, that the eggs are its prey; and yet there ſeems not to be a ſufficient diſproportion between the ſize of the one and the other for this purpoſe; at leaſt it muſt take more than one to nouriſh a larva of the *Ichneumon* to its proper ſize. Where we are not in poſſeſſion of ſufficient inſtances to eſtabliſh any fact beyond doubt, it would be great preſumption to be too poſitive; I ſhall not therefore pretend to decide in which of its ſtates our fly furniſhes food to the offspring of this *Ichneumon*. I think we may with more confidence affirm, that it is attached to *Tipula Tritici* in one of them. The circumſtance of its depoſiting its eggs within the florets of the wheat, in the very ſituation choſen by that inſect for the ſame purpoſe, and uſually where either its eggs or larvæ were concealed, ſufficiently eſtabliſhes this point; unleſs we may ſuppoſe it to prey upon *Thrips Phyſapus*. This latter inſect, however, to the beſt of my recollection, I did not find in any of thoſe florets which I examined after ſeeing this *Ichneumon* inſert its *aculeus* into them. It is probable that its appearance is later, as there is no mention of it in my memoranda of this year.

(*v*) Tab. iv. fig. 5. b.

On

On the twenty-fecond of June I obferved another *Ichneumon* (*w*), not uncommon, piercing the florets of the wheat. This fpecies did not appear to infert its *aculeus* between the valvules of the corolla, but to pierce the glumes of the calyx; to effect which purpofe it is armed with a very fhort one fub-exerted: of this I found both the fexes; the male was diftinguifhed from the female by its large eyes, placed very near each other, with reticulations unufually vifible. I prefume this to lay its eggs in the larvæ, but have not been able pofitively to afcertain the fact. Upon the fame day that I firft obferved this fpecies, our *Ichneumon Tipulæ* made its appearance in great numbers; a ftrong proof that the larvæ were now generally hatched. Concerning this *Ichneumon* I have no new remarks to offer, except that it muft introduce itfelf within the floret to come at the larvæ, as appears from its mode of laying its eggs (*x*): fo that thefe three enemies of the *Tipula* have each a different method of attacking it. The firft undermines its little fortrefs, the fecond makes a breach in the walls, and the third carries it by ftorm (*y*).

Amongft the infects of other genera that I particularly noticed upon the wheat this feafon, the *Aphis granaria* (z) was common; as was likewife a fpecies of *Cimex* in all its ftates, but I could not perceive that it devoured our *Tipula*. It anfwers in fome refpects to *C. lateralis* of Fabricius (*a*), but in others it differs much from it: I fhall add a defcription of it to the others at the end of this letter.

(*w*) Tab. iv. fig. 10. (*x*) *Linn. Tranf.* vol. iii. p. 243. and vol. iv. p. 236.

(*y*) On the fourth of July I faw another *Ichneumon* inferting its aculeus into a floret of wheat, but it evaded my endeavours to take it. It feemed much too large to have any connection with our *Tipula*.

(*z*) *Linn. Tranf.* vol. iv. p. 238, note *.

(*a*) *Fabr. Sp. Inf.* 2. p. 372. n. 209. *Linn. Syft. Nat.* ed. Gmel. p. 2190. n. 517.

Several

Several ſpecies of the genus *Empis* alſo frequented the wheat fields, often carrying off our *Tipula* in their diminutive beaks.

I have now given you as complete an account of theſe inſects as the obſervations of the preſent year enable me. Something ſtill remains to be done; for inſtance, to aſcertain the male, the hybernacula of the pupa, to collect further facts relative to the two new *Ichneumons*, and, from obſervations taken in ſucceſſive years, to determine how far our crops of this grain depend upon the increaſe or decreaſe of the *Tipula* and its *Ichneumons*.

Cui bono? is a query often put to naturaliſts; and the agriculturiſt perhaps will aſk upon the preſent occaſion, Can you inform us how we may prevent or diminiſh the ravages of theſe inſects? In reply to this, I would obſerve, that the firſt ſtep towards curing a diſorder, is to find out its cauſe. In the preſent inſtance this is the buſineſs of the naturaliſt, and this *is* done. The intelligent farmer has no longer to aſk what occaſions the miſchief; all he has now to do, is to aim at diſcovering a remedy. By a ſet of experiments firſt made upon a ſmall ſcale, he may poſſibly find out ſome method that will prevent this inſect from laying its eggs in his wheat: theſe ſhould commence as ſoon as the ear begins to quit the *folium vaginans* or hoſe; and they ought to be continued till the germen is impregnated, or, to uſe the rural phraſe, the wheat is off the bloſſom. Perhaps fumigations of tobacco or ſulphur, if made when the wind was favourable, might render the ear diſagreeable to this inſect. Much of the injury which this fly does, in years peculiarly favourable to its increaſe, it is poſſible, by ſome ſuch means might be prevented; yet it is not certain that the total annihilation of it would be ultimately beneficial (*b*). But be it granted that our labours lead the

(*b*) We are very apt to think, that if certain noxious ſpecies of animals could be annihilated, it would be a great benefit to the human race; an idea that ariſes only from our ſhort-

the way to no difcovery of this kind, may it be faid that we have been idly bufy and unprofitably laborious, when we have fucceeded in developing fome of the moft curious myfteries of nature, and in laying open the hiftory of fome of thofe fecondary caufes, which, guided by the hand of Providence, produce fcarcity or plenty as the one or the other preponderate?

As I made my defcription of *Tipula Tritici* laft year from a fingle fpecimen, and that produced before its time, it will hardly be deemed tautology if I draw out a new one; more efpecially as an error with refpect to the colour of its wings, much calculated to miflead an examiner, has crept into it. In my MS. I find it "*alis albidis*," but I fee it is printed "*alis hyalinis*," an expreffion which completely mifreprefents their colour. As two new fpecies of *Ichneumon* are to be defcribed, it may alfo not be amifs to work over again the defcription of *Ichneumon Tipulæ* with a view to them.

TIPULA *Tritici.*

T. rufo-fulva; oculis nigris; alis lacteo-iricoloribus margine pilofis.

Fæmina (c).

Tota rufo-fulva; thorax intenfiùs, pedes autem dilutiùs. *Antennæ* corpore fublongiores, duodecim-articulatæ articulis pedicellatis oblongis

fhort-fightednefs, and our ignorance of the other parts of the great plan of Providence. We fee and feel the mifchief occafioned by fuch creatures, but are not aware of the good ends anfwered by them, which probably very much exceed it. I have heard of farmers, who, after having taken great pains to deftroy the rooks from their farms, upon being fuccefsful, have fuffered infinitely more in their crops, from the great increafe of the larvæ of infects, before kept under by thefe birds, than they ever did from the rooks themfelves. The fame might be the cafe, could we annihilate the *Tipula* of the wheat; for every link of the great chain of creation is fo clofely connected on each fide with others, and all parts fo combine into one whole, that it feems not eafy to calculate the confequences that would arife from the entire removal of the moft infignificant, if any can be deemed fuch, from the fyftem.

(*c*) Tab. iv. fig. 1.

oblongis medio constrictis (*d*), pilosulæ, nigricantes. *Oculi* nigri suprà conniventes. *Alæ* corpore longiores, amplæ, apice rotundatæ; margine omni, sed interiori præcipuè, piloso; lacteæ coloribus prismaticis pro situ variè micantes. *Abdomen* vaginâ instructum retractili aculeum longissimum filiformem exserente.

Longitudo corporis (*vaginâ exclusâ*) lin. 1.

Tritici spicas primâ æstate vesperi circumvolitat, intra flosculos aculeum ani inserens, ova inibi positura post quatuordecim dies larvæ exclusæ polline antherarum vel nectare stigmatum vescuntur granum exinanientes (*e*).

ICHNEUMON. *Minuti, abdomine ovato sessili.*

1. *inserens.* I. ater; antennis capitatis; abdomine lanceolato nitido (*f*).

Corpus atrum. *Antennæ* fractæ capitatæ. *Caput* et *thorax* subobscuri. *Alæ* hyalinæ aveniæ corpore longiores; superiores lineolâ nigrâ, a basi versus medium ductâ, puncto rotundo desinenti, notatæ. *Abdomen* lanceolatum, aterrimum, nitidissimum, valdè acutum, aculeum longissimum flexilem exserens. *Pedes* nigrescentes femoribus atris subclavatis.

Longitudo corporis infra lineam.

Præcedenti æqualis et hostis; horis diurnis circa spicas triticeas volans. In cujus flosculis, aculeo inserto, ovis *Tipulæ Tritici*, uti suspicor, ovula sua committit.

(*d*) Tab. iv. fig. 3. The singular form and mode of insertion of the joints of the antennæ are not to be seen, but under a powerful magnifier.

(*e*) Qu. Does Linnæus's *Ichneumon secalis* (Syst. Nat. Gmel. p. 2714. n. 70) belong to the larva of a *Tipula?*

(*f*) Fig. 4.

The

The antennæ of this very minute inſect are exceedingly ſingular (*g*). The firſt joint is long, rigid, and clavate (*h*); examined in a certain direction obcordato-bifid at the apex; this diviſion ſerves as a ſocket for the next joint to act in (*i*), which is connected with it by means of a ſtrong membrane or muſcle (*k*), and performs the part of a ball or pivot: the four next joints are perfectly globular (*l*), and extremely minute: the clava, unleſs under a very powerful magnifier, appears ſolid; but, in that caſe, it is plainly diſcerned to conſiſt of four articulations very cloſely ſet together (*m*).

2. *Tipulæ.* I. niger; antennis baſi pedibuſque rufis; tibiis poſticis clavatis apice nigris; abdomine obovato (*n*).

Corpus nigrum. *Antennæ* fractæ vibratoriæ, thorace longiores, rufæ articulis quatuor ultimis majoribus nigris. *Caput* et *thorax* ſubobſcuri. *Alæ* aveniæ immaculatæ, corpore longiores. *Abdomen* obovatum, nitidiſſimum, ſubdepreſſum, ſubſeſſile. *Pedes* rufi ſ. rufo-teſtacei, tibiis clavatis, poſticis apice nigris.

Longitudo corporis infra lineam.

Tipulæ Tritici larvis contemporaneus, infeſtus, quibus concredit ovula ſua, ovum unicum deponens ſingulis.

The antennæ of this inſect, as well as every other part, are extremely different from thoſe of the laſt. They conſiſt firſt of a very long joint rather flexuous (*o*); from this to the four laſt joints, under a powerful magnifier, we could diſcover no articulations (*p*), and yet from the mode in which this part of the antennæ appears ſometimes to be bent, I cannot help ſuſpecting that there are ſome,

(*g*) Tab. iv. fig. 6, 7. (*h*) Fig. 7. a. (*i*) c. (*k*) b. (*l*) d.
(*m*) Fig. 7. e. (*n*) Fig. 8. (*o*) Fig. 9. a. (*p*) Fig. 9. b.

although

although extremely minute. The four laſt joints are black, very diſtinct, and much larger than the reſt (*q*).

3. *penetrans.* I. nigro-æneus; abdomine atro-cæruleſcente, compreſſo; ano truncato, aculeo ſub-exſerto (*r*).

Corpus nigro-æneum, nitidum. *Antennæ* nigræ, clavatæ, thorace breviores, acutæ. *Alæ* aveniæ, hyalinæ; ſuperiores lineolâ mediâ marginis craſſioris nigrâ demum in diſcum obliquè incurrente, et puncto rotundo deſinenti. *Abdomen* atro-cæruleſcens, ſub-compreſſum, ano truncato, aculeo ſub-exſerto.

Longitudo corporis infra lineam.

Triticum frequentat ſimul cum præcedenti, glumas aculeo brevi penetrans ovula poſiturus. Maris oculi majores, pallidiores, approximati.

The clava of the antennæ of this little inſect conſiſts of four joints ſet cloſe together (*s*); the laſt is the largeſt, and acute. We could not with certainty determine whether its footſtalk was jointed or not.

I owe the drawings of the antennæ of the three laſt inſects to the accurate eye and pencil of the Rev. Peter Lathbury, of Woodbridge, F. L. S. a moſt ingenious and intelligent naturaliſt. Theſe *Ichneumons* (*t*) may be placed after *Ichneumon ſecalis* of Linnæus, and *Tipula Tritici* after *Tipula Pini* of De Geer.

(*q*) Tab. iv. fig. 9. c. (*r*) Fig. 10. (*s*) Fig. 11. a.

(*t*) The remarkable variations in the form of the antennæ in theſe three ſpecies, undoubtedly of one genus, ſufficiently prove that Geoffroy was wrong in ſeparating his genus *Eulophus*, &c. from *Ichneumon* merely on account of that circumſtance. *Hiſt. ab. des Inſ.* ii. p. 312. pl. xv. fig. 3.

I ſhall

I ſhall now, as I promiſed above, proceed to deſcribe the *Cimex* which I found ſo common upon the wheat in all its ſtates.

CIMEX. *Oblongi, antennis ſetaceis longitudine corporis.*

Tritici. C. anguſtus, niger; thoracis lateribus, coleoptrorum limbo, femoribuſque pallidis.

Corpus valde anguſtum, nigrum. *Roſtrum* thoracis longitudine, pallidum. *Antennæ* obſcurè rufæ articulo primo majore pubeſcenti, nigro. *Caput*, fronte acuta, poſticè pallidum, lineâ intermediâ longitudinali exaratum. *Oculi* prominuli. *Thorax* anticè anguſtior, lateribus lineoliſque tribus intermediis poſticis, pallidis. *Scutellum* nigrum lineâ intermediâ elevatiuſculâ. *Elytra* nigricantia margine exteriori latè pallida, pallore paululùm virenti. *Alæ* hyalinæ iricolores. *Pedes* lividi, tibiis tarſiſque poſticis nigris.

Longitudo corporis lin. 4.

Habitant in *Tritici* culmis et ſpicis, *Larva, Pupa, Imago.*

So much for this year's obſervations upon *Tipula Tritici.*

Believe me, &c. &c.

EXPLA-

Linn. Trans. V. tab. 4. p. 111.

EXPLANATION OF TAB. IV.

FIG. 1. *Tipula Tritici* magnified, with its *Vagina* and *Aculeus.*

2. (a) The *Vagina.* (b) The *Aculeus.* (c) The *Eggs* paſſing through the *Vagina.* (d) A patch of *Eggs.* (e) A *Larva* newly hatched, and adhering to the lower end of one of the Anthers.

3. A portion of one of the *Antennæ* greatly magnified to ſhew the form of its joints.

4. *Ichneumon inſerens* magnified.

5. *Abdomen* of ditto. (a) *Aculeus* exerted, long and flexile.

6. The *Antenna* of ditto.

7. A different view of the *Antenna.*
   (a) The *firſt joint*, long, rigid and clavate, obcordato-bifid at the apex.
   (b) The *membrane* that connects the ſecond joint with it.
   (c) The *ſecond joint*, which acts the part of a ball or pivot.
   (d) The four following joints, globular and extremely minute.
   (e) The *Clava* of four joints ſet cloſely together.

8. *Ichneumon Tipulæ* magnified.

9. The *Antenna* of ditto.
   (a) The firſt joint, very long.
   (b) The ſpace from the firſt to the four laſt joints, not viſibly articulate, but I ſuſpect it to be ſo.
   (c) The four laſt joints, black, and larger than the reſt.

10. *Ichneumon penetrans* magnified.

11. The *Antenna* of ditto.
   (a) The *Clava* of four joints ſet cloſe together, the laſt the largeſt and acute.

X. *Obſervations upon certain Fungi, which are Paraſitics of the Wheat.* *By the Rev. William Kirby, F. L. S.*

Read February 5, 1799.

DURING the time that my attention has been directed to thoſe inſects which frequent the wheat fields, I have often had occaſion to obſerve the appearances produced in that grain by ſeveral different ſpecies of *Fungi* (*a*), which derive their nouriſhment from it. I thought of conſidering this ſubject at large; but as my time is likely to be fully employed in other purſuits, I ſee no probability of doing this in the manner that I could wiſh; and therefore having made ſome obſervations, which, though by no means complete, may not be wholly unimportant, I now beg leave to lay them before the Linnean Society, truſting that they may ſerve as hints to others who may be inclined to enter more fully upon ſo intereſting a ſubject.

I have noticed five or ſix different ſpecies of theſe *Fungi*. The firſt I ſhall mention is named by Dr. Withering *Reticularia ſegetum* (*b*). In the Rev. Henry Bryant's pamphlet upon *Brand* (*c*), it is called

(*a*) That theſe appearances are produced by minute vegetables of the order of *Fungi*, ſeems now to be acknowledged by thoſe naturaliſts who are the moſt converſant with that order.

(*b*) Bot. Arr. vol. iv. p. 388.

(*c*) A particular Enquiry into the Cauſes of that Diſeaſe in the Wheat commonly called Brand, &c. Norwich 1783.

Duſt

Duſt Brand (*d*). Here its uſual name is *Smut* or *Burnt Corn.* This ſpecies is common to wheat, oats, barley, and rye. I have alſo ſeen *Feſtuca fluitans*, and ſome other graſſes, affected by it. It is ſcentleſs, and conſumes not only the farinaceous part of the grain, but even the arillus and chaff, diſperſing itſelf entirely before the corn is cut; ſo that the injury which it occaſions is confined to the quantity of grain deſtroyed by it, which is not very great in any ſeaſon. I have ſeen, more than once, half an ear of corn affected by this *Fungus*, when the other half was ſound and good. Sometimes it injures all the ſtems that ſpring from the ſame root; at other times part of them eſcape: I never could diſcover any diſeaſed appearance about the root. The ear is often affected by this *Reticularia* before it emerges from the *folium vaginans*, or *hoſe*.

Barley and oats are more frequently attacked by it than wheat; but this may be accounted for by the latter being uſually *dreſſed* for ſowing. Mr. Lathbury examined the duſt of this *Fungus* under a powerful magnifier, and found that it conſiſted of a number of minute particles, uniform in ſhape and ſize, much ſmaller and blacker than thoſe of the Pepper Brand, and leſs eaſily ſeparable: they ſeemed to be contained in little irregular cells. This duſt or ſeed is the food of a ſmall, ſhining, black *Dermeſtes* (*e*).

The next ſpecies that I ſhall mention is what Mr. Bryant diſtinguiſhes by the name of *Pepper Brand* (*f*); with our farmers it is ſimply called *Brand* or *Bladders.* This ſpecies does not eat through the arillus, conſuming only the farinaceous part of the grain. The ears affected by it are eaſily diſcovered by their external aſpect; for the chaff opens, as if unnaturally diſtended (*g*), the germen becomes ſhorter and rounder, and exhibits the appearance both of ſwelling

(*d*) Bryant, p. 31. 54—56. (*e*) *Dermeſtes ater.* Marſham. (*f*) Bryant, p. 32.

(*g*) Bryant, p. 43.

 and

and (if it may be allowable to apply ſuch a term to it) inflammation; for, inſtead of the pale, pleaſant green which is the colour of this grain in a healthy ſtate, it aſſumes one of a deep and dingey hue: in this ſtate it eaſily breaks when rubbed; and the ſooty powder, that ſoils the fingers, emits a very fetid ſcent, extremely ſimilar to that of putrid fiſh or *Cheuopodium Vulvaria*. Theſe circumſtances ſufficiently diſtinguiſh it from *Reticularia ſegetum*, and render it, when at all plentiful, exceedingly prejudicial to the farmer; for, as it does not eat its way through the arillus, and diſperſe itſelf before the corn is cut, it is carried with it into the barn, and, being broken under the flail, when the wheat is threſhed, diſcolours and otherwiſe injures the ſample, to ſuch a degree as to render it unſaleable, or at leaſt greatly to reduce its price. To prevent this evil, farmers generally dreſs their ſeed wheat with various preparations: ſome uſe a lixivium of wood aſhes and urine; others, ſalt and water only, or ſea water if at hand; others, the lie from the ſoap-boilers; others again, urine and cheeſe whey; and I have heard of ſome who have infuſed arſenic for this purpoſe. All, I believe, dry their ſeed with freſh ſlaked lime. This cuſtom, which is nearly univerſal, at leaſt in theſe eaſtern counties, proves the idea to be general, that the diſorder originates from the adheſion of the duſt or ſeed of the Brand to the ſeed of the wheat, and that by theſe methods it is either waſhed off or deſtroyed: but what kind of ſubſtance it is, whether animal, vegetable, or merely a diſtemper incident to this grain, agriculturiſts do not trouble themſelves much to inquire: this indeed is properly the buſineſs of the naturaliſt; and of theſe latter the opinions concerning it are various. Mr. Bryant, in the pamphlet referred to above, is ſtrenuous for its being occaſioned by an injury which he ſuppoſes the *antheræ* receive, by too great conſtriction, when the ear emerges from the *folium vaginans* (*h*); and therefore he ſcouts

(*h*) Bryant, p. 50—53.

the

the common practice just mentioned of dressing the seed, as answering no good end, and destructive of the grain (*i*). Some take the dust for the eggs of insects, and others adopt, what to me appears the most probable opinion, that this evil is occasioned by a minute vegetable of the order of *Fungi*.

Mr. Bryant founds his hypothesis upon few experiments, and those not very precisely stated (*k*): the one was favourable rather than otherwise to the practice which he is endeavouring to set aside (*l*). This was made upon a small scale in his garden. From his larger experiment no fair consequences in support of either side of the question can be drawn; for it was made in two separate fields, the corn being sown unprepared in one, and dressed as usual in the other (*m*). Whether these fields were near to each other, or far asunder, or of a similar or different soil, he does not inform us. The result of this experiment was rather in favour (not much he confesses) (*n*) of the undressed seed. Now, as some years are much more favourable to the production of Brand, it is probable, than others (*o*), and it is not to be expected that any precaution should so infallibly secure our crops as that they shall never be injured, no sound reasoner would venture to build a system upon experiments, much more numerous and decisive than those related by Mr. Bryant, which were made in a single year. Again, as some soils may be more given to the production of this disease, or whatever we are

(*i*) In justice to this gentleman, I must acknowledge, that, with respect to this circumstance, his opinion seems founded upon fact; for I am informed by intelligent farmers, that much of the grain *does* perish, as they suspect, by the use of lime. But is the evil incurred, greater than the evil prevented?

(*k*) Bryant, p. 24, 25. (*l*) Id. p. 32, 33. (*m*) Id. p. 24, 25. (*n*) Id. p. 33.

(*o*) A tenant of mine, in the year 1797 I think, told me that his wheat that year was very much injured by the Brand, although he prepared it in the same manner as he had done for ten years before, and always till then with success.

to call it, than others, nothing ſatisfactory can be deduced from ſuch experiments as are tried in different fields, where the ſoil, aſpect, or mode of cultivation and management, might be different. Mr. Bryant's method of accounting for this diſorder is certainly ingenious, but founded upon no arguments which can convince one who is in ſearch not of theories but of truth. That the practice of dreſſing the ſeed previous to ſowing, in the way above mentioned, is a very effectual preventive of the Brand, will appear ſufficiently evident, when I proceed to lay before the Linnean Society the reſult of ſome experiments made by my ingenious and accurate friend the Rev. Peter Lathbury, F. L. S. Upon my informing him that I was going to put together a few obſervations upon the ſubject, he very obligingly allowed me the uſe of his memorandum-book, which alſo related another very deciſive experiment, upon a large ſcale, made by a gentleman of his acquaintance. It was in conſequence of reading Mr. Bryant's treatiſe that Mr. Lathbury and this gentleman made their experiments. To theſe I ſhall add a few inſtances, out of many, that have fallen within my own knowledge.

Mr. Lathbury procured two ſmall parcels of wheat, one from a clean ſample not at all infected by the Brand, and the other from one which it had much injured. Each parcel he divided into four equal portions, and prepared for ſowing as follows, dreſſing one portion from each parcel in the ſame manner. The firſt he waſhed carefully with ſpring water, and wiped with a ſoft dry cloth. The next he dipped in ſtrong white wine vinegar, and allowed to dry upon a ſheet of writing paper. A third he covered with ſalt water taken from the river; and after letting it remain in it for twelve hours, he wiped it as the firſt. The fourth portions were not dreſſed at all. The wheat from the clean ſample was planted on one ſide of his garden, and that from the branded one on another. When he

ſowed

sowed the two undressed portions, before he covered the seed with earth he sprinkled upon it some Brand dust. The result of his experiment was, that the three first portions of both sorts which had been prepared for sowing were very little injured by the Brand. Those which were from seed of the clean sample had only one ear affected, and that partially. Those from the branded sample produced two ears that were partially branded, and three that were affected by the Smut or Dust Brand (*Reticularia segetum*). But the produce of those portions which had been sprinkled with the dust of the Pepper Brand was greatly injured by it, three-fourths of the grain being destroyed. There appeared no difference in the number of plants produced from each portion of the clean seed; every grain vegetated, except in one instance, where it was evident that those which perished were destroyed by an insect: but the number of plants produced from the injured seed was various; that which was washed with water produced the greatest number, and that wetted with vinegar the smallest. Mr. Lathbury, in the dressing of the seed for his experiment, does not appear to have used lime; which I should apprehend to be the most efficacious preventive of the evil, though at the same time it may probably be most destructive of the seed. These portions of wheat were sown at Orford on the 20th of September 1786.

The other experiment was made in the neighbourhood of Woodbridge in the following year. I shall give it in Mr. Lathbury's words: "Mr. John Woolnough of Boyton, a most intelligent and excellent farmer, read Mr. Bryant's pamphlet, and, in consequence of his arguments, the next year sowed a large field in alternate breadths with wheat taken from a good sample (*without dressing*) and wheat that had been dressed in the usual manner. Long before the corn was ripe, the difference was most distinguishable. Upon

those

thoſe *ſtretches* (*p*) ſown with dreſſed wheat it was difficult to find any branded ears, except upon the edges, where it is probable the undreſſed had been occaſionally thrown in ſowing it by hand. The other breadths were ſo branded as to make it neceſſary for him to determine to carry the corn at ſeparate times to different places. A wet ſeaſon ſetting in, the hurry of buſineſs made him neglect this precaution; and being all houſed together, the whole crop, when threſhed out, was ſpoiled ſo much by the Brand duſt as to render the ſample unſaleable. He computed his loſs at 50l." I ſhall now copy an inſtance from Mr. Lathbury's memorandum-book, of miſchief incurred by a defect in the quality of the lime uſed for drying the ſeed: "Mr. Howlett of Blighborough Lodge, always accuſtomed to dreſs his wheat with ſalt water and freſh ſlaked lime, was induced, from the magnitude of his concern, to purchaſe a quantity of lime which from ſome circumſtances was offered to him at a much leſs price than uſual. When he dreſſed his wheat with it, it was *air-ſlaked*, but did not appear otherwiſe altered by keeping; yet had it ſo far loſt its ſtrength, that his crop that year was injured by the Pepper Brand to the amount of upwards of 300l. in the opinion of good and able judges." Thus far Mr. Lathbury's communications.

I ſhall now proceed, as I propoſed, in the next place to mention ſome inſtances which fell within my own knowledge. Laſt year an intelligent farmer informed me, that through haſte he had neglected to dreſs part of his ſeed wheat, and that in conſequence of it the crop of the field where it was ſown was greatly injured by the Brand, while the reſt of his wheat was free from it. He alſo informed me, that if old wheat was uſed for ſeed, it was not ſubject to it. During

(*p*) I know not the orthography of this word. It is uſually pronounced *ſletches*. It is the name given to thoſe breadths, narrower or wider according to the nature of the ſoil, into which a field is divided previous to ſowing.

the present year, a gentleman who occupies a considerable tract of land in the parish of Barham, and who is very attentive to farming, told me, that in a particular field, the dressed seed not holding out, they sowed the headland with what was undressed. The consequence was, that this part was very full of the Pepper Brand, while the rest of the field escaped. Another gentleman, who was brought up in the medical line, but has now taken to farming, assures me, that since he has dressed his wheat he has never suffered from this evil; and so convinced is he of the efficacy of the common method, that he is determined to prepare barley and oats in the same way, in order to prevent the *Dust* Brand. I could multiply more instances, if necessary, from information received from other quarters; but I think these are fully sufficient to prove that Mr. Bryant's hypothesis is not founded upon facts. It seems evident from them, that the mischief is carried with the seed into the field (*q*), and that the usual mode of dressing it acts as a sufficient preventive. From one of Mr. Lath-

(*q*) It may be objected here, that seed wheat is always taken from a clean sample, and that therefore it is most probable that it should meet with the seeds of the Brand in the soil; but in that case how could the previous dressing, especially a single washing, act as a preventive? Old seed, we see, is not subject to it; which must, I should think, arise either from the Brand Dust being rubbed off by the frequent friction of the grains one against another, when turned over, or from the latter losing its vegetative principle: but neither of these circumstances would hinder its attack, if the Brand Dust were already in the soil. Besides, its remaining within the grain, and not like the *Dust Brand* eating through the arillus, militates strongly against such a supposition. It is probable that in every wheat field a few scattered ears may be branded, and these would be sufficient to infect a large parcel of grain; for every diseased kernel contains millions of seeds of the Brand, and the frequent turning over and mixing of the corn would disseminate these through a considerable quantity. Still I would not be understood to assert, that Brand left in the soil never attacks the wheat: such a circumstance may account for its prevalence in some seasons, even where corn has been dressed: all I contend for is, that this is not usually the case.

bury's

bury's experiments it appears, that the ſimple waſhing of the ſeed with water, if it be carefully wiped, anſwers all the end of ſteeping in a more expenſive preparation. This perhaps could not be done with ſufficient care and accuracy upon a large ſcale, otherwiſe the moſt ſimple and leaſt expenſive method is certainly the beſt, and all that ſeems to be wanted previous to ſowing is thoroughly to cleanſe the ſeed from the Brand duſt that adheres to it. Probably wetting the ſeed with water, and afterwards drying it with freſh ſlaked lime, would anſwer every purpoſe.

The ſuppoſition that the Brand is produced by inſects is not ſupported by one fact or experiment that I have ever heard of: indeed, the ſingle circumſtance that the diſorder originates with the ſeed, and from thence paſſes by ſome unknown channel into the plant, entirely overturns it. I ſhall not therefore loſe time by dwelling upon it, but proceed further to eſtabliſh the third opinion, that the diſorder is occaſioned by a vegetable ſubſtance. The fact eſtabliſhed by the above experiments, that the duſt of Brand, carried into the field with the ſeed wheat, like other vegetables propagates itſelf, gives the higheſt degree of probability to this opinion; which is ſtill further confirmed by the reſult of Mr. Lathbury's experiment of ſowing it as it were upon its native ſoil (eſpecially in the caſe of wheat taken from a clean ſample), which ſeems to have occaſioned the deſtruction of three-fourths of its produce. This is as deciſive a proof as can be deſired of its being a vegetable. But what I think places the matter beyond all doubt, is that this duſt, when put under a powerful magnifier, exhibits every appearance of minute ſeed. I happened to take ſome duſt from branded grains, I think laſt year, which I laid by for future inſpection. After I had begun this Paper, I ſtrewed ſome of that duſt upon a piece of glaſs; and putting it under a very ſtrong magnifier over a reflector, I was highly grati-

fied

fied with obferving that every particle of Brand was a globular feed; not the leaft variation in fhape or magnitude was vifible amongft them. I afterwards put a drop of water upon them, and let them remain in this fituation for fome time; but it produced no alteration whatfoever in their appearance. I afterwards examined in the fame way the duft of one of the ftellated *Lycoperdons* which I happened to have by me; but the particles of this were much fmaller than thofe of the Brand, and not of a form fo vifibly determinate. Mr. Lathbury alfo tried a variety of experiments with the fame view; and in every one "the duft when diluted with water inftantly feparated, and prefented to the eye invariably a number of globules, touching each other, alike in form and fize."

It now remains for confideration, how thefe feeds vegetate and afcend from the feed with the growing plant till they reach the heart of the grain. This is an inquiry that may be extended to a great number of the *Fungi*, which without impropriety may be denominated *fubcutaneous* vegetables: for inftance, the feveral fpecies of *Æcidium* (for they are numerous), *Uredo* (r), and not a few *Sphæriæ*, except that thefe latter grow upon decaying fubftances: but thefe I fhall let alone, and only offer a conjecture, for it is merely fuch, with refpect to the Brand. Perhaps then the uncommonly minute feeds of this *Fungus* may attach themfelves either to the *plumula*, and fo pafs through the air veffels into the plant; or elfe to the *roftellum*, which to me feems moft probable; and in that cafe they may be propelled through the fap veffels with the fap, till at length they arrive at their final feat, the heart of the germen. Whether this fpecies belong to the genus *Reticularia* or not, I muft leave to be determined by thofe gentlemen who are more deeply fkilled in "*cryptogamic lore*" than I am.

(r) Are *Æcidium* and *Uredo* fufficiently diftinct?

The next *Fungus* of the wheat that I ſhall notice, is that *Æcidium* known to agriculturiſts by the name of the *Red Gum.* This ſpecies grows uſually upon the inſide of the glumes of the calyx and of the exterior valvule of the corolla, under their *epidermis*; which, when the plant is ripe, burſts, and emits a powder of a bright orange colour. This little plant, which is now well known (*s*), does not appear to be materially injurious to the grain, if at all. I have ſeen ears full of it, with very plump kernels. I have alſo found it upon branded ears. Before the cuticle which covers the ſeed of this *Fungus* burſts, it has very much the appearance of a ſmall puſtule upon the human body.

Another plant of this order, which is very common upon wheat, is that named by Mr. Lambert in the Linnean Tranſactions (*t*), and by Mr. Sowerby in his elegant work upon Engliſh Fungi (*v*), *Uredo Frumenti.* It grows upon the foliage, culm, and glumes, burſting in longitudinal ſtreaks from under the *epidermis.* Theſe gentlemen repreſent this plant as the *blight* of the wheat, which in certain ſeaſons and ſoils is ſo injurious to that grain. I had myſelf for ſome time ſuſpected that it was the cauſe of that diſeaſe; but after repeated examination of ears the ſtraw of which was quite black with it, I had given up that opinion, for in no one inſtance was the grain injured by it. Yet I would by no means be underſtood to contradict the aſſertion of theſe gentlemen *in totum.* This plant, when it makes its attack before the wheat begins to harden, by depriving it of part of its nutriment may occaſion it to ſhrink; and Mr. Lambert's own experience ſeems to confirm this obſervation: unleſs the miſchievous plant which I ſhall next mention had taken poſſeſſion of the ear, at the ſame time that the *Uredo Frumenti* had diſcoloured the ſtalk;

(*s*) *Linn. Tranſ.* vol. iii. p. 249, 250. (*t*) Id. vol. iv. p. 193, 194.
(*v*) *Engliſh Fungi,* vol. ii. tab. cxl.

for

for the ſame circumſtances would be favourable to the production of both, although we have reaſon to be thankful that the latter is much the moſt common of the two. I doubt not but theſe gentlemen will readily excuſe my diſſent from their ſentiments in this inſtance; and ſhould future examination prove me in the wrong, I ſhall with pleaſure retract. In ſubjects not thoroughly diſcuſſed and underſtood, the colliſion of opinions contributes very much to bring hidden truths to light.

In the year 1797 the wheat ſuffered much by the *blight*, or *mildew* as our farmers more commonly call it, by far the worſt enemy of that grain; and I had frequent opportunities of examining into the cauſe of it. The ears that were injured by it were to be diſtinguiſhed at a conſiderable diſtance by their blackneſs; and when brought cloſe to the eye, they appeared as if ſoot, or ſome other ſmutty powder, had been ſtrewed over them. Under a common lens (for at that time I had no other) the chaff appeared covered with ſmall black dots irregularly ſcattered over it, and widely different from the appearance of *Uredo Frumenti* upon the ſame part, which is very accurately repreſented in Mr. Sowerby's figure. Whenever this appearance ſeizes an ear, it invariably occaſions the grain to ſhrink ſo much as to be fit for nothing but to feed hogs or poultry. I do not recollect making any obſervations upon the ſtate of the ſtraw; but I have a memorandum, made in a field from which I took many ears, which ſays that the ſtraw of the mildewed wheat in that field was clean; and if my memory does not fail me, the mildew itſelf was always confined to the ear; though ſometimes the ſtraw might be affected, as I hinted above, by *Uredo Frumenti* at the ſame time. Some farmers, whom I have conſulted, have told me that the ſtraw is always injured; but others have confirmed my own obſervation in the field above mentioned, that it is not invariably ſo. I ſhould obſerve, that the foliage

R 2 of

of the mildewed wheat in this field was diſtinguiſhed by another ſpecies of *Uredo*; though perhaps this might be only another appearance of the mildew, which diſcharged its ſeed at regular intervals in dots. From the abſence of *Uredo Frumenti* in this inſtance, it is evident that the mildew is independent of that plant, and ſo *vice verſâ*. A whole diſtrict in the neighbourhood of Barham is particularly given to this evil; but improved management of the ſoil, I am told, will ſerve as a remedy. The appearance occaſioned by the mildew, upon an ear examined under a lens, did not ſo fully convince me of its being a *Fungus*, as that of the four preceding ſpecies; the dots were too minute to determine with certainty without a more powerful magnifier: yet I am moſt inclined to that opinion; and it derives additional force from what was once related to me by a gentleman who had been abroad, that an Italian Abbate, I forget who, had written a memoir upon the ſubject, in which he had proved the mildew to be a very minute *Lycoperdon*. He promiſed to ſend me the pamphlet, but was not ſo good as his word. The preſent year produced no mildew, that I can learn; and I ſent my ſpecimens to Mr. Sowerby.

I have now brought to a concluſion what I had to ſay upon thoſe paraſitic *Fungi* which I have obſerved upon the wheat; and I hope that theſe hints, for ſuch only I deſire that they may be conſidered, may induce other gentlemen, more deeply ſkilled in this department of natural hiſtory than I am, to purſue them further. The ſubject, if viewed as cloſely connected with agriculture, is certainly important; and if the ſtudy of it ſhould lead to a diſcovery of a method of preventing the *Blight*, as effectual as that which has long been uſed by farmers to ſecure their crops from the *Brand*, the naturaliſt who led the way to it would have no reaſon to think that his labours were in vain.

Much has been done in this country towards inveſtigating the

Fungi

Fungi by Meſſ. Withering, Woodward, Dickſon, Bolton, Sowerby, &c. yet the knowledge of this claſs of vegetables is *adhuc in incunabulis*, and many years muſt elapſe before we may expect to ſee it upon the ſame firm footing with the other branches of botany. There is ſcarcely a leaf (at leaſt of trees and ſhrubs) falls to the ground, that has not its peculiar *Fungus*, which, aſſiſted by humidity, reduces it to its original earth. The ſame obſervation may be extended to ſticks (*w*) and ſtalks, and many other ſubſtances. The more we attend to theſe things, the further we ſhall ſee into the plan of Divine Providence, and, every ſtep we take, be more and more convinced that there is nothing either deficient or ſuperfluous; but that all things are created in weight and meaſure, and work together (whether their office be to preſerve or to deſtroy) to promote the beſt ends by the moſt efficacious means.

(*w*) Mr. Sowerby, in his *Engliſh Fungi* (vol. ii. tab. cxxxvii), has given the name of *decorticata* to a particular ſpecies of *Sphæria*, as ſuggeſted by me, probably owing to my bad writing. The name I intended was *decorticans*, from the circumſtance of its growing under the bark, and finally occaſioning it to peel off.

XI. *Ca-*

XI. *Calendarium Plantarum marinarum.* By *Dawſon Turner, Eſq. F.L.S.*

Read March 5, 1799.

IN ſubmitting to the Linnean Society a liſt of the periods at which ſome of the Britiſh marine *Algæ* produce their fructification, it may not perhaps be wholly unneceſſary to preface it by obſerving, that the habitation of many of theſe plants at the bottom of the ocean, remote from any ſhore, where we are of neceſſity precluded from all poſſibility of tracing them through their ſeveral ſtages of growth, is certainly one of the greateſt obſtacles to our procuring a clear and comprehenſive knowledge of them. How far the difficulties ariſing from this circumſtance can ever be entirely removed, time and experience muſt alone determine; but we have reaſon to entertain very ſanguine hopes, as the beauty of this tribe has of late years attracted many admirers, to whoſe zeal and abilities marine botany is much indebted; and this Society may boaſt of having given to the world by far the moſt valuable account ever written of theſe plants. But much ſtill remains to be done; and it can be done only by naturaliſts reſident upon the different parts of the coaſt accuſtoming themſelves to examine attentively the various ſpecies in their ſeveral gradations, and laying before the world the reſult of their inquiries. To ſtimulate them to this, was one of my principal objects in bringing forward the preſent remarks; for, as no Britiſh author has given us any thing like a complete liſt of the times of fructification of the ſubmerſed *Algæ*, thoſe naturaliſts who are in the

the habit of occasionally visiting the sea, and collecting its productions, are led to expect that whatever they find they will find in perfection; which has not unfrequently been the cause of error as well to themselves as to others. For, to mention one instance among many, the *Fucus subfuscus*, which is one of the most common species upon the Norfolk shore, and fructifies only in the earliest months of spring, is generally gathered in September, and often throughout the whole winter, with its stem and branches swollen in various parts; which swellings many very learned botanists have mistaken for fruit, and conceived themselves discoverers of either, what they called, diamorphous fructification, or new species; although, from having again and again, in company with my worthy friend Mr. Wigg, A. L. S. examined these tumours, I can safely pronounce them nothing more than the substance of the frond swollen, and caused, as I imagine, by some marine insect, the same being, though not so frequently, observable upon other *Fuci*. It were easy to enlarge upon this subject, and produce many similar instances of error; but as this one is sufficient to establish my point, I shall refrain from saying more at present, as I may probably at some future time lay before this Society a few remarks more particularly relating to the mode of fructification that obtains in these vegetables.

Having, on the foregoing accounts, been long conscious of the greater facility which would attend our investigation of the marine *Algæ*, could we fix with tolerable precision the times when we might expect to gather them at maturity, I have constantly habituated myself to commit to writing at what months I have found the different species in fruit; and though my list must necessarily be imperfect, as well because I am obliged to trust to the winds and waves, the nature of our shore not allowing us to visit them in their places of growth, as because we find upon our coast only a limited number,

ber, I neverthelefs flatter myfelf with the hope that it may have its ufe, by inducing the botanifts of diftant counties to beftow fome attention upon this neglected branch of a favourite fubject. For its accuracy, as far as it extends, I can with fafety vouch, as I have admitted nothing that has not been the refult of my own actual obfervation, either upon *Fuci* found along the Norfolk fhore, or upon a few which I have at various times received through the medium of failors from the fouthern counties.

It now only remains for me to add, that a principal caufe of the imperfection of the following Catalogue lies in our being wholly unacquainted with the fructification of many fpecies, as *Fucus faccharinus*, *Filum**, *viridis*, &c. together with almoft all the membranaceous *Ulvæ*, and a great proportion of the *Confervæ*; which genus I fhall hardly mention, as our knowledge of the fpecies is at prefent fo imperfect, that it requires more than ordinary fortune to find two botanifts who agree in affigning to the fame plant the fame name.

YARMOUTH,
February 10, 1799.

* This *Fucus*, figured in the *Flora Danica*, tab. 886, was, I believe, firft difcovered to be a native of Great Britain by Sir Thomas Frankland, Bart. F. L. S. and is occafionally gathered upon the Yarmouth beach. It deferves to be remarked, that when frefh it is of a beautiful orange colour, which it lofes after having been a fhort time expofed to the air, and becomes of a pale verdegris green; but if kept in frefh water it changes this alfo to a dark brown.

JANU-

JANUARY.

Fucus ſanguineus.
ſinuoſus.
loreus.
ciliatus.
membranifolius.
radiatus.
lumbricalis.
plicatus.
ſiliquoſus.
criſpus.
bifidus.
nodoſus.
ſerratus.
patens.

FEBRUARY.

Fucus nodoſus.
ſiliquoſus.
ſerratus.
ſubfuſcus.
plicatus.
ſinuoſus.
criſpus.
laciniatus.

MARCH.

Fucus nodoſus.
ſerratus.
plicatus.

Fucus ſubfuſcus.
ſiliquoſus.
ſinuoſus.
criſpus.
laciniatus.

APRIL.

Fucus nodoſus.
ſerratus.
plicatus.
diffuſus.
ſubfuſcus.
ſinuoſus.
criſpus.
laciniatus.
Conferva coccinea. *With.*
polymorpha.

MAY.

Fucus ſubfuſcus.
ſinuoſus.
laciniatus.
criſpus.
diffuſus.
Conferva coccinea.
polymorpha.

JUNE.

Fucus coccineus.
hypogloſſum.

Fucus kaliformis.
dafyphyllus.
afparagoides.
byffoides.
diffufus.
Conferva rubra.
diaphana.
Ulva atomaria.
purpurafcens.
ligulata.

JULY.

Fucus kaliformis.
hypogloffum.
byffoides.
coccineus.
afparagoides.
pedunculatus.
dafyphyllus.
pinnatifidus.
Conferva rubra.
diaphana.
ciliata.
Ulva ligulata.
atomaria.
dichotoma.
rubens.
purpurafcens.
fiftulofa.

AUGUST.

Fucus kaliformis.
pedunculatus.
purpurafcens.
byffoides.
afparagoides.
coccineus.
dafyphyllus.
bifidus.
hypogloffum.
Conferva rubra.
diaphana.
ciliata.
Ulva ligulata.
atomaria.
dichotoma.
fiftulofa.
rubens.

SEPTEMBER.

Fucus crifpus.
dafyphyllus.
afparagoides.
confervoides.
bifidus.
coccineus.
purpurafcens.
laceratus.
Conferva rubra.

Ulva rubens.
dichotoma.
atomaria.
fiſtuloſa.

OCTOBER.

Fucus bifidus.
radiatus.
faſtigiatus.
coccineus.
purpuraſcens.
criſpus.
rubens.
laceratus.
membranifolius.
ſanguineus.
ciliatus.
plicatus.
nodoſus.
confervoides.
Conferva rubra.
Ulva dichotoma.
atomaria.

NOVEMBER.

Fucus ſiliquoſus.
criſpus.
bifidus.
purpuraſcens.
lumbricalis.
radiatus.
plicatus.
nodoſus.
ciliatus.
pinaſtroides.
confervoides.
membranifolius.
Ulva dichotoma.
atomaria.

DECEMBER.

Fucus loreus.
nodoſus.
lumbricalis.
criſpus.
ſiliquoſus.
fibroſus.
radiatus.
ſanguineus.
purpuraſcens.
membranifolius.
ſerratus.
ſinuoſus.
ciliatus.

Fucus veſiculoſus and Ulva diaphana are found in fruit during the whole year.

XII. *An Account of the Onchidium, a new Genus of the Clafs of Vermes, found in Bengal. By Francis Buchannan, M. D. A. L. S.*

Read June 5, 1798.

THIS animal, which I have always found on the leaves of the *Typha elephantina* of Dr. Roxburgh, is very nearly allied to the Slug or *Limax*; but differs in fo many of the circumftances confidered by Linnæus as characteriftic, that I imagine it will be found to conftitute a new genus. To this I would give the name *Onchidium*, from the number of little tubercles with which the whole upper part of the animal is covered.

VERMES. Mollufca. *Ore antico, corpore brachiato.*

ONCHIDIUM.

CHAR. GEN. *Brachia* duo ad latera capitis. *Tentacula* duo. *Os* anticum. *Anus* pofticus, infra.

ONCHIDIUM *Typhæ.*

Habitat in foliis *Typhæ elephantinæ.*

The body in its ftate of reft is oblong, convex above, about an inch long and three quarters of an inch broad, covering all the organs. When the animal creeps it becomes linear, obtufe at both ends, about an inch and a half or two inches long, and half or three quarters of an inch broad; and the arms and feelers of the animal then become vifible. It is flat, black, and fmooth below; above convex,

convex, aſh-coloured, and covered with glandular tubercles irregular in ſize and poſition.

United lengthwiſe, on the under ſide, to the body is what Linnæus would call the foot of the animal, as being the organ of motion and ſtability. It is of a dirty yellow colour, linear, about a quarter of an inch ſhorter than the body at each end when in motion, and obtuſe at the ends: it is flat below, and perpendicular at the ſides. It conſiſts of many tranſverſe rings, like a *Lumbricus*, by means of which the animal can move with tolerable quickneſs, adheres firmly to the ſmootheſt ſurfaces in all directions, and turns itſelf ſlowly round.

The head is yellowiſh, ſmall, and placed under the fore part of the body, at the fore end of the foot, to which it is joined. During the various operations performed by the animal, its head is conſtantly changing its form and ſize; and, when entirely at reſt, it is drawn up ſo as to be hardly perceptible. When fully expanded, the head is flat and oval below; and there is a mouth placed lengthwiſe with reſpect to the animal. This mouth alſo is conſtantly varying its ſhape from circular to linear. From each ſide of the head comes what Linnæus calls an arm (*brachium*), like thoſe of the *Scyllæa*, conſtantly varying its form and ſize, and at times entirely drawn in. Theſe arms are ſolid, compreſſed, and, when fully expanded, ſomewhat palmated; at leaſt they are much broader and flatter towards the outer extremity. From the forehead ariſe two feelers, *tentacula* of Linnæus, exactly like the horns of a Slug, and having the appearance of eyes at their extremities.

This is not, like many others of the worm kind, an hermaphrodite animal, for the male and female organs of generation are in diſtinct individuals. I have not yet perceived any mark to diſtinguiſh the ſexes while they are not in copulation, as, in both, the anus and

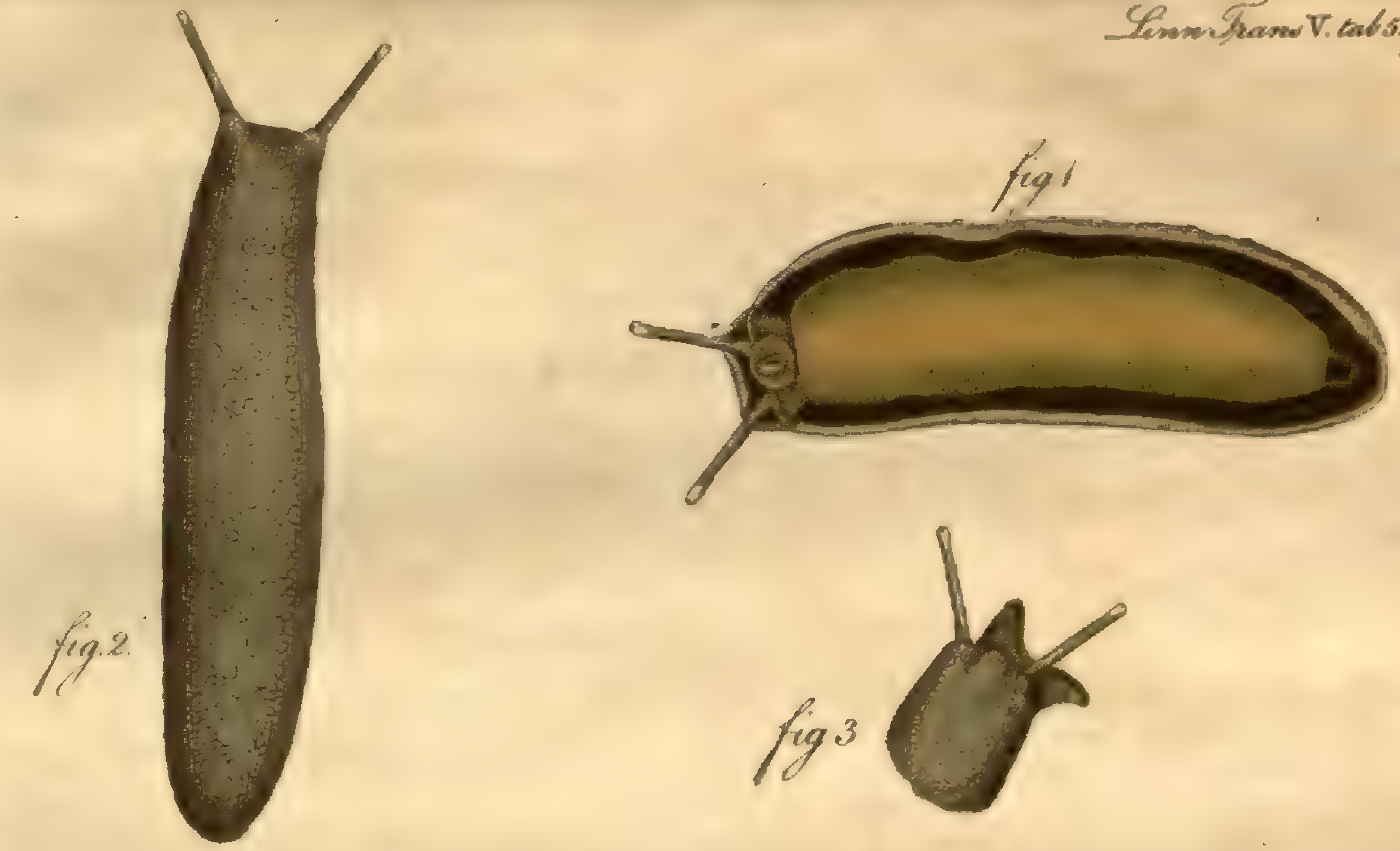
and ſexual organs are placed in a perforation (*cloaca communis*) in the under part of the tail, immediately behind the foot: but during coition the diſtinction of ſexes is very evident, the penis protruding to a great length, conſidering the ſize of the animal. I have as yet learned nothing with regard to the geſtation of the female, or how ſhe produces her young.

EXPLANATION OF THE FIGURES.

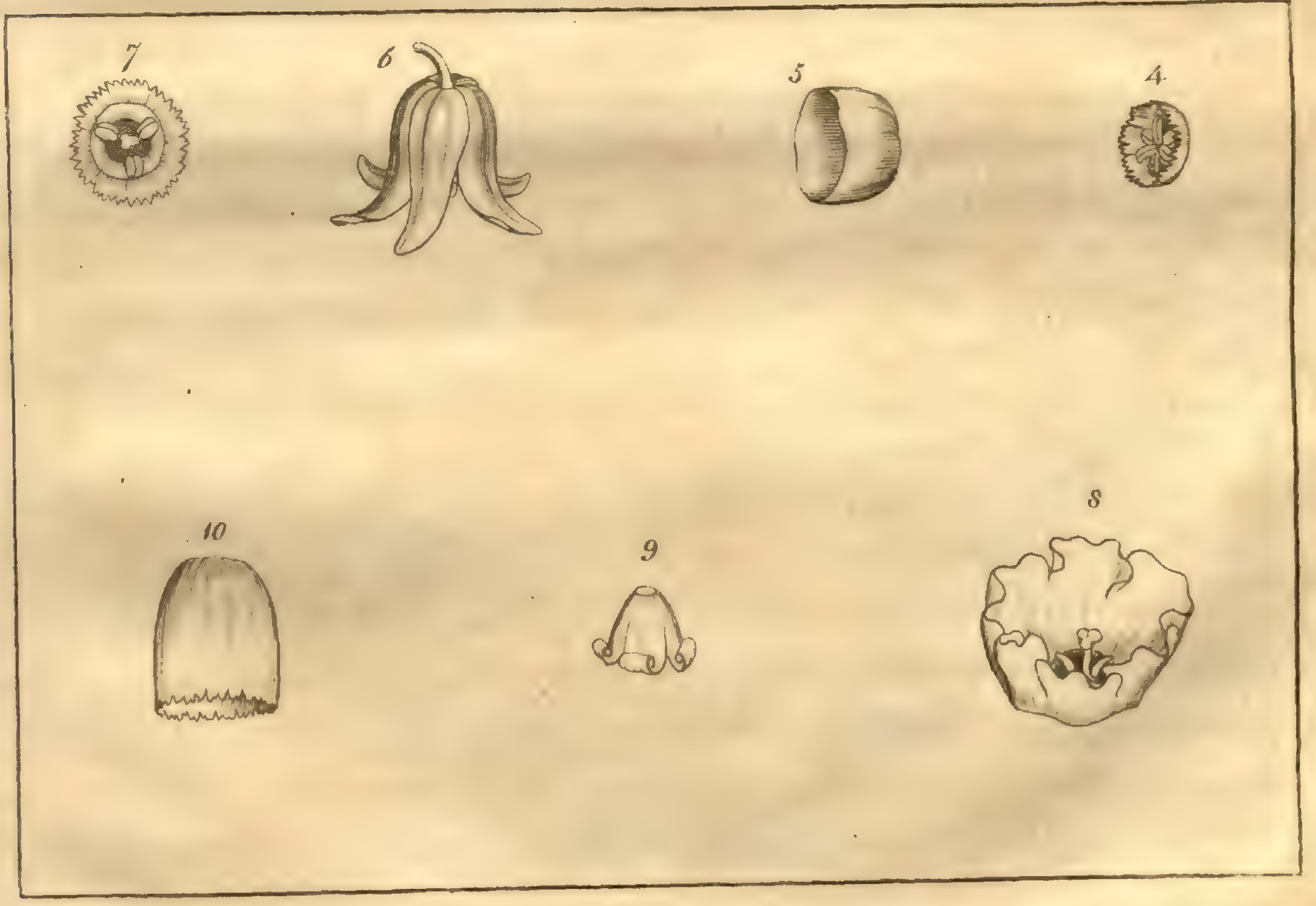
TAB. V. *fig.* 1. The under ſide of *Onchidium Typhæ*.
2. The upper part.
3. The ſide view of the head.

XIII. *Re-*

Linn. Trans. V. tab. 5. p. 134



Onchidium typhæ



XIII. *Remarks on ſome technical Terms uſed in Botany.* *By R. A. Saliſbury, Eſq. F. R. S. & L. S.*

Read July 3, 1798.

AFTER the ſcientific Obſervations of Profeſſor Martyn on Botanic Language, publiſhed in the firſt volume of this Society's Tranſactions, and in an Engliſh tranſlation of the *Termini Botanici* of Linné, any thing further on the ſame ſubject may ſeem unneceſſary: but I am in the habit of uſing ſome terms in a ſenſe different from the Linnean definitions, and of excluding as well as introducing others, in my deſcriptions of plants; and I wiſh to learn how far the opinions of more experienced botaniſts agree with my own. Should I be encouraged, I may probably in future ſtudy this part of botany more particularly. What I have now to offer follows alphabetically.

Abbreviatus. This term in *Amœn. Acad.* is only mentioned under Perianthium, where an abbreviated perianthium is defined, not ſo long as the tube of the corolla. I recollect no inſtance of its being uſed in deſcriptions; ſo that it is ſcarcely worth retaining except for a ſpecific name. *Brevis* ſupplies its place, and admits of degrees of compariſon more readily.

Abruptè pinnatum folium. I conſider every leaf which terminates without an odd foliolum, as abruptly pinnated. Linné excludes *Cirrhus* alſo, or any other part: but, in that caſe, ſuch a leaf

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would rarely be met with; for I have yet ſeen no abruptly pinnated leaf, which had not ſome little proceſs or other beyond the laſt foliola. *Cirrhi* are inſerted very differently in different plants; and being particular organs deſtined to ſupport ſcandent ſtems, their inſertion ſhould always be ſeparately mentioned.

Acetabuliformis. Like a circular ſhallow ſaucer with the ſides more or leſs incurved. *Tab.* 5. *f.* 4.

Acicularis is nearly ſynonymous with *ſubulatus*, but I conſider it as indicating a more delicate and pungent point.

Acuminoſum folium. This I would define, apice in acumen planiuſculum attenuatum, to diſtinguiſh it from all other points.

Adſcendens. Synonymous with *incurvus*.

Adverſorum foliorum paginæ ſuperiores, a directione quā inſeruntur ratione caulis, verſus cœlum vertuntur, hinc quantum maximum lucis obtinentes: ut folia *Ulmi campeſtris, Linn.*

The definition of this term in *Amœn. Acad.* is exceedingly obſcure, and can be underſtood only from examples of it. All the *adverſa folia* I have ſeen were both *diſticha* and *obliqua*, according to the Linnean meaning of *obliqua*.

Æquata ſuperficies omnis inæqualitatis expers eſt: nec canaliculata, ſtriata, ſcrobiculata, punctata, &c.

I have found this term very uſeful: it differs from *planus*, in not requiring the part to be level, or in a rectilinear direction, but frequently occurs in round bodies; as in the peduncles of *Ixiæ*.

Alveolata pars depreſſionibus oblongis exaratur; ut totus *Liriodendri tulipifera, Linn.*

Aſſurgens

Assurgens scarcely differs from *adscendens* or *incurvus*: it seems peculiarly proper to describe the change which takes place in the position of the leaves of *Mimosæ* and other sleeping plants.

Axis. Synonymous with *Columella.*

Bina folia. Leaves inserted in three very different ways may yet all be called *bina*: either when they are opposite, as in *Lamium*; fasciculated, as in *Pinus*; or approximated, as in the flowering branches of *Datura*.

Calathiformis. Bowl-shaped: hemisphærical and concave. *Tab.* 5. *fig.* 5.

Calyx. Jussieu, to whose judgement I pay the highest deference, contends that this term is the most proper for that involucrum, which in the natural order of *Liliaceæ* has hitherto commonly been called corolla. Among other reasons he adduces the Linnean canon, that this part is a continuation of the cuticle of the plant. I very much doubt, however, if this really be true; for the spatha in this natural order seems to me the first expansion of the cuticle, and the true calyx. A proper bractea will always be found at the base of the pedunculus, though in many genera it is hid between the insertion of the leaves; but in *Hæmanthus* it is coloured, and very conspicuous.

Campanulatus. Somewhat like the bell of a church; at the base more or less bellying out, with the rim a little recurved. *Fig.* 6.

Capreolatus. Synonymous with *cirrhosus*.

Circinalis. This term is confined by Linné to describe the manner in which the young spikes in the natural order of *Boragineæ*, and

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the young leaves of *Filices*, are rolled up: it is then ſynonymous with either *involutus* or *revolutus.*

Colum. A common receptacle on which the ſeeds are inſerted in ſome pericarpiums: it is probably analogous to the placenta in animals, and very conſpicuous in the natural order of *Didynamia Angioſperma.*

Cotyliformis. This term differs from *acetabuliformis* in having ſtraighter ſides not incurved. *Tab.* 5. *fig.* 7.

Crateræformis. Somewhat like *calathiformis*, but not ſo much bellying out, and rather approaching to *infundibuliformis.* Fig. 8.

Cyathiformis. Like a wine-glaſs: more or leſs obconical and concave. *Fig.* 9.

I have found this, and all the other terms of which I have given figures, very uſeful in diſtinguiſhing ſome of the ſpecies of *Narciſſus* and *Erica.*

Declinatus. Bent down.

This term is rendered quite unneceſſary by *deflexus*, *recurvus*, and *reclinatus*, which expreſs the mode of flexion more preciſely.

Diſcus. The ſurface of any part excluding the borders.

So I would diſtinguiſh it from *Pagina.*

Elliptica pars longior quam lata eſt, marginibus medio lineis fere parallelis, extremitatibus plus minus ſemicircularibus, æqualibus.

Linné often confounds this term with *oval.*

Faſtigiatus, according to the two Linnean definitions, is ſynonymous with either *corymboſus* or *conicus.*

I now only uſe it for any part that is towering or lofty.

Favoſus.

Favoſus. Somewhat like a honeycomb.

This term will be found very uſeful in deſcribing the receptacles of the claſs *Syngeneſia.*

Flagellum. Profeſſor Giſeke wiſhes to diſtinguiſh a Caulis *ſarmentoſus* by this title: but I think two names for one part unneceſſary; and on the ſame principle I reject *Culmus*, *Scapus* and *Frons*, for *Caulis*, *Pedunculus* and *Folium*.

Hypocrateriformis corolla. I would diſtinguiſh this by its having the lower part of the limb perfectly horizontal with reſpect to the tube: not by the ſhortneſs of the tube.

Irregularis corolla. Having its parts differing in proportion.

The eſſential character of an irregular corolla ſeems to me to reſpect ſolely proportion. Many ſpecies of *Gladiolus* have all the diviſions of the corolla exactly alike, except the uppermoſt being a little more erect; and yet they are evidently irregular.

Lamina. I always, with Forſkäl, deſcribe the upper part of a petiolated leaf by this term. *Limbus* I confine to corolla, even in polypetalous as well as monopetalous flowers.

Lenticularis. Plus minus ſphæricus margine acuto; inſtar ſeminum *Dracænæ enſifoliæ, Linn.*

Ligulatus. Somewhat linear, and much longer than broad.

Lyræformis. Figura ſuperne ſemiovalis, inferne anguſtior lateribus lineâ plus minus arcuatâ exciſis.

The flowers of *Ixia grandiflora, Roch.* afford an example of this term.

Marcefcens. Not falling off after it is withered; in which fenfe Lœfling ufes it.

Medioliformis. Somewhat globular and truncated at both ends, like the nave of a wheel.

The tube of *Cynogloffum omphalodes*, *Linn.* is an inftance.

Menifcoideus. Somewhat globular, with one fide concave.

Nitidus. Synonymous with *lucidus*.

Obliquus. Aflant: cut away in a floping direction, like the flowers of *Vinca* and leaves of *Begonia.*

Linné has defined this term very differently, and has given for examples of his meaning the leaves of *Protea* and *Fritillaria:* thefe leaves, however, may be more properly called *torta*; and he himfelf fometimes ufes *obliquus* in the fenfe I have given to it above.

Pagina. The whole furface of any part, including the border.

Papillaris. Somewhat like a nipple.

I think this term fhould be diftinguifhed from *verrucofus*. *Papillofus* founds too like *papulofus*.

Perfiftens. Continuing a long while green with refpect to the other parts of the fame flower or plant.

Poculiformis. Hollow and cylindrical with an hemifphærical bafe, the fides at the top ftraight, and not recurved. *Tab.* 5. *fig.* 10.

Prifmaticus. Synonymous with *triqueter*.

Recepta-

Receptaculum. The common ſupport or baſe of more flowers than one: it is a very important part in the claſs *Syngeneſia.*

Reclinatus. Curved firſt in a convex, then in a concave line; like the leaves of many ſpecies of *Erica.*

Scrobiculata pars depreſſionibus majuſculis ſuborbicularibus excavatur; ut colum *Trientalis europeæ, Linn.*

Spiralis linea uno pluribuſve circulis ſenſim elevatur.

The different parts of vegetables may be either ſpirally inſerted, like the flowers of *Ophrys ſpiralis, Linn.* or ſpirally directed, like the leaves of *Coſtus ſpecioſus, Smith.*: or they may ſpirally extend themſelves, like the ſtem of *Valliſneria paluſtris, Linn.*

Strophiola. A fungous or callous appendage placed about the hilum in the ſeeds of many genera: it is very ſingular in ſome of the ſpecies of *Mimoſa* and *Glycine* from New Holland.

Tortum folium. More or leſs twiſted.

Twiſted parts ſhould be accurately diſtinguiſhed from *ſpiral* parts, though the ſame direction occurs in both: but in the former the axis of the ſpiral line is in the parts themſelves; in the latter quite diſtinct, or out of them.

Torus. The common ſupport, or baſe, of the different parts of a ſimple flower.

In many flowers it is very ſmall, and entirely hid by the parts inſerted upon it; but in *Ranunculus, Paſſiflora, Magnolia,* and many other genera, it becomes very conſpicuous.

Trapeziformis. An area with four unequal ſides.

Trochlearis. Pulley-ſhaped, or like a cylinder that is narrowed in the middle.

The embryo of *Corypha* is an example of this term.

Turbinatus. Top-ſhaped: it only differs from Pear-ſhaped in being ſhorter, and more ſuddenly attenuated at the baſe.

Verrucoſus. Covered with rough tubercles like warts.

EXPLANATION OF THE FIGURES.

TAB. V. fig. 4. Corona acetabuliformis Narciſſi Radiiflori, *Saliſb. Prodr.*

5. Corona calathiformis Narciſſi Grand-Citronier, *Floriſtarum.*

6. Flos campanulatus Scillæ campanulatæ, *Soland.*

7. Corona cotyliformis Narciſſi patellaris, *Saliſb. Prodr.*

8. Corona crateræformis Narciſſi ampli, *Saliſb. Prodr.*

9. Corolla inferne cyathiformis Apocyni Androſæmifolii, *Linn.*

10. Corona poculiformis Narciſſi poculiformis, *Saliſb. Prodr.*

XIV. *Ac-*

XIV. *Account of a Cavern discovered on the North-west Side of the Mendip Hills, in Somersetshire.*

By George Smith Gibbes, M. B. F. L. S.

Read April 2, 1799.

PERHAPS the following account of a cavern which I visited some time since may be acceptable, as we there see the process going on, which Nature employs to enclose foreign substances in the hardest rocks.

At the bottom of a deep ravine on the north-west side of the Mendip Hills, in Somersetshire, near the little village of Berrington, there has been discovered a cavern of considerable extent, in which was found a great collection of human bones.

As I have observed in this cavern many circumstances which appear curious to me, I beg leave to mention them, as I do not believe there is another place in the kingdom where the different stages (if I may be allowed the expression) of bones incorporating with lime-stone rocks can be so well seen. From the top and sides there is a continual dripping of water, which being loaded with a large quantity of calcareous earth, deposits a white kind of paste on most parts of the cavern. Many of the bones are incrusted with this cement, and a large proportion of them are actually fixed in the solid rock. I suppose therefore that this substance, which at first is in a state resembling mortar, by losing its water hardens into a firm and solid

 stone.

ſtone. I had an opportunity of examining the proceſs in every part. Had the cavern not been diſcovered, and theſe depoſited ſubſtances not been removed, I do not doubt that the whole excavation would, in no great length of time, have been completely filled up. The water was ſtill bringing freſh quantities of calcareous earth, and the bones were in ſome places completely incorporated with the ſolid rock. Every degree of intermediate ſolidity was plainly diſcernible. There were ſeveral nodules of ſtone, each of which contained a perfect human ſkull. The ſubſtance which is depoſited from the water effervеſces with acids, and has, in ſhort, every character of limeſtone. At the farther end of this very curious cavern, where the height is about fifteen feet, there depends a moſt beautiful ſtalactite, perfectly conical, which, when the cavern was firſt diſcovered, reached within an inch of a cone of the ſame kind which riſes from the floor. By ſome accident a ſmall part of the ſtalactite was broken off; but Nature is now buſy in repairing an injury which had been done to one of the prettieſt productions of her mineral kingdom. Had theſe two cones met, a moſt beautiful column would have been formed, of nearly fifteen feet in height. On ſtriking this ſtalactite, a ſound is produced ſimilar to that of a bell, which may be heard at a conſiderable diſtance beyond the mouth of the cavern.

I examined the bones with conſiderable attention, and I found that there was adhering to the ſurface of many of them, a ſubſtance which reſembled the ſpermaceti I have before deſcribed, in the Philoſophical Tranſactions for the years 1794 and 1795.

I have to add, that this cavern was diſcovered about two years ago by accident, and that no ſatisfactory reaſon has been given for this ſingular accumulation of human bones.

XV. *Re-*

XV. *Remarks on the Nature and Propagation of marine Plants. By Lieut. Col. Thomas Velley, F. L. S.*

Read May 7, 1799.

HAVING, in a former inquiry into the mode of propagation peculiar to marine plants, attempted to point out ſome material errors, which accompanied the theories of Gmelin and Gærtner, by proving, that the membranaceous *Fuci*, which the former conſidered as merely proliferous, derived their origin from actual ſeeds; and that the numerous tribe of *Confervæ*, which Gærtner, upon a very ſlight and ſuperficial examination, has dogmatically declared to be deſtitute of ſeminal increaſe, were beyond a doubt dependent upon the ſame general law of Nature, for their propagation, as the *Fucus:* I ſhall now lay before this Society ſome further obſervations upon the ſubject, ariſing principally from an examination of the recent theories that have very lately made their appearance in the world. It may not however be foreign to the purpoſe, to inveſtigate the definition of the generic character prefixed by Linnæus to the *Fucus*, and which does not appear to be clearly ſtated.

In the *Genera Plantarum* he defines the ſuppoſed male flower as follows: "Veſiculæ glabræ, cavæ, pilis intus aſperſæ;" rendered by the Lichfield Society, "Veſicles ſmooth, hollow, ſprinkled with hairs within;" and in the *Nereis Britan.* "Bladders ſmooth; hollow, interſperſed within with ſoft hairs." Linnæus, however, cautiouſly introduces this definition upon the authority of Reaumur;

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he difclaims all pretenfions to the difcovery upon which it is founded, and moreover afferts, in the *Philofophia Botanica*, that the florefcence of the *Fucus* had been firft brought to light by that author. Now Reaumur in no inftance admits that the male flowers are contained in the air-bladders. On the contrary, he pofitively maintains that the pencilled clufters of fine hairs, fpread on the furface, are the male flowers exclufively. Whatever ambiguity, therefore, may be attached to the word "veficulæ" as applied by Linnæus, or however he may have varied his mode of expreffion at different times, ftill we are to recur to the account of the difcovery, as ftated by Reaumur, for the real import and meaning which ought to have been conveyed in the definitions of Linnæus; fince on that alone his doctrine of the male flower appears to reft. The defcription cited above from the *Genera Plantarum* feems evidently to relate to the air-bladders in the *Fucus veficulofus*, and has induced fome authors to confider the fructification as confined to thofe parts*;—while others again, purfuing the fame opinion, and who at the fame time adopt the doctrine of Reaumur and Donati, that the pencilled clufters of hairs, fcattered over the furface of the frond, are the male flowers, will find themfelves reduced to the neceffity of admit-

* In the laft edition of the *Botanical Arrangements* it is obferved, under *Fucus veficulofus*, that "the bladders in the fubftance of the leaf contain the fructification." Dr. Withering, agreeably to the method which he has conftantly purfued throughout that valuable work, very properly produces the authority of Linnæus in fupport of the above opinion. In the fame work, the *Fucus ferratus* is alfo noticed as having "two kinds of fructifications fufficiently obvious;" *i. e.* the feed-veffels in the fummits, and the clufters of fine hairs externally fituated. But it muft not be paffed over, that the fame appearances *are equally obvious* on the *Fucus veficulofus* and all its varieties. Admitting therefore that the male flowers are contained in the air-bladders, the *Fucus veficulofus* muft of courfe have *three* diftinct parts of fructification; one expofed, another concealed, and the third in the fummits (univerfally admitted) producing the feeds.

ting two different males, on the ſame plant, operating in a manner not only diſtinct from, but directly oppoſite to, each other: for one of them (as we have juſt ſeen) is deſcribed as internally ſituated and concealed in the air-bladders, while the other is external and expoſed to view in thoſe ſmall open veſſels upon the ſurface of the plant*. But ſuch an œconomy does not appear to have proof or analogy

* My friend Mr. Stackhouſe had adopted the ſame opinion in his very ingenious inveſtigation of theſe plants, and mentioned "the monœcious character as clearly diſcernible in ſome" of the *Fuci*; as alſo the twofold ſtate of the male flowers, one of which is repreſented as externally ſituated, and expoſed to view in the urceolate veſſels; the other, concealed in the air-bladders—"*in interiore veſicularum grandiorum.*" In a ſubſequent faſciculus he informs us, with that true ſpirit of candour which directs his reſearches and entitles them to the moſt reſpectful attention, that the doctrine of a monœcious character muſt be totally abandoned, ſince upon a more critical and attentive examination he finds "the previous fructification is effected *internally*." This laſt point being admitted, there hardly remains a ſhadow of difference between our reſpective opinions, as far as relates to the propagation of this curious tribe of plants. I muſt obſerve, however, that as I could not in the firſt inſtance attribute to thoſe capillary veſſels the important function which belongs to a ſtate of floreſcence, ſo neither can I reconcile myſelf to a contrary extreme, "that thoſe filaments might be nothing more than an exuding mucus"—admitted in the ſecond faſciculus of *Ner. Brit.* p. 13. This opinion is taken up principally upon the diſappearance of thoſe fine hairs when immerſed in water; as if they at once became reſolved into a mucous fluid. But the fact is, they ſtill remain in the ſame unaltered ſtate, and may be diſcovered in the aquatic microſcope in a ſtrong light during their immerſion. Their extreme tenuity and minuteneſs may cauſe them to collapſe, and adhere to the ſurface of the plant; and their tone of colour, which may aſſimilate itſelf to that of water, will no doubt render them difficult to be ſeen. Theſe pencilled cluſters are repreſented in the firſt plate and faſciculus of the *Ner. Brit.* in their urceolate veſſels. If they were deſtined to carry off the mucus, they would not be excluded from the internal maſs by thoſe callous veſſels in which they are confined. If they were part of the fluid, they would be of very different lengths. Beſides, theſe filaments exiſt when the plants are in their firſt and moſt tender ſtate (as I have obſerved upon a former occaſion), and before they produce the leaſt appearance of mucus. This fluid is not conſtantly produced, and principally abounds in a ſtate of maturity. In ſummer time it may ſometimes be ſeen before

analogy to support it, throughout the whole vegetable creation. The locality of two such bodies demonstrates their respective functions to be diametrically opposite; for, while the favourite idea of florescence may suggest the possibility of external communication, between the minute filaments on the surface and the fructified summits which contain the seeds, the situation of the second flower in a bladder, so impervious as to retain its internal air, necessarily excludes the possibility of a grosser body escaping externally through such a substance. Should it be asserted, that the fecundating principle therein contained may be of so pervading a nature as to find an internal course through the solid coriaceous texture of the frond itself; although, for reasons which I shall hereafter assign, I cannot admit that it exists in those bladders, yet I concur in the general principle. It is what I have chiefly endeavoured to point out in my former tract upon this subject. If then, to use the expression of the ingenious author of the *Nereis Britannica*, "the impregnation may be effected by a subtile vapour," in other words, by some unknown operation, the fact seems highly probable. This is "that self-inherent principle" which I before asserted to exist, and upon the apparent œconomy and wisdom of the Divine Author, "who has admirably tempered the constituent principles of natural bodies in such due proportions as might best fit them for the state and purposes they were intended for*." But then we ought not, upon mere hypothesis, to wrest such hidden faculties (for unknown surely they are) from their inscrutable course, and arbitrarily assign their effects to the supposed

before it is disengaged from the frond; and then it forms a very curious depôt immediately under the surface, appearing like distinct globules extremely minute. In this state I have seen it in very thin transverse sections of the *Fucus saccharinus* under the microscope. At first sight I flattered myself I had discovered the seeds of that *Fucus*.

* Hales.

mechanical

mechanical operation of parts, which are neither calculated to promote, or capable of communicating, thoſe reciprocal functions which reſult from a ſtate of floreſcence.

It has been juſtly obſerved by one of the greateſt philoſophers of the preſent age*, "that Nature though varied is generally uniform in her operations." The more we contemplate the extenſive volume which ſhe preſents to our view, the more this obſervation will become confirmed: but while it tends to vindicate the exiſtence of a principle equivalent to, as I have before maintained, though differently modified from, that which directs the ſexual ſyſtem, it cannot reconcile itſelf to the aſſumption of two diſtinct males acting by different proceſſes in the ſame plant, any more than it can admit either of thoſe bodies ſeparately to conſtitute a ſtate of floreſcence, when, from their permanent and unchangeable nature through all the ſucceſſive periods of the plant's exiſtence, as well as from their relative ſituations, they militate againſt every law of analogy, as far as reſpects the Linnean ſyſtem.

Linnæus, when he maintains the univerſal influence of the laws of floreſcence over the vegetable world, cloſely defines the preciſe character of the flower itſelf, aſſerting, that its very eſſence exiſts in the ſtigma and antheræ, which, connected with the pollen containing the fertilizing vapour, can alone conſtitute a ſtate of floreſcence; and that, without theſe eſſential parts, even the bloſſom with its exterior appendages could not in any reſpect be conſidered as a flower.

The uniformity and mechanical exactneſs which directs the ſources of vegetable impregnation, throughout the immenſe ſeries of terreſtrial plants, could not fail to attract the admiration of the recent votaries to the ſexual ſyſtem. Strengthened in their opinions

* Sir William Hamilton.

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by the general conformity of the laws of Nature, and exulting in the confutation with which modern difcoveries had overwhelmed the former prevailing theories, it is not matter of furprife that they fhould have eftablifhed the laws of florefcence upon fo ftrict a dogma. Science, too long infulted by the prepofterous tenets of equivocal generation, had already turned away in difguft from the ancient writers, who favoured that ill-founded doctrine. The principles of vegetable life now became the object of philofophical difcuffion; and the important difcovery of Harvey, which had long fince brought to light the circulation of the blood, feems, by an eafy tranfition, to have directed the refearches of Hales towards a fimilar principle in vegetable bodies; when, at length, the propulfion of the fap became beautifully exemplified by his unerring ftaticks. Every day brought forth new difcoveries; and thofe plants which had apparently furnifhed the ftrongeft arguments to the opponents of the fyftem, were now compelled to difclofe their myfterious œconomy, and, by exhibiting the hidden fources of their impregnating powers, feemed at once to eftablifh the univerfal extent of the newly eftablifhed doctrine. When Linnæus firft announced the difcovery of feeds in the Mofs, was it to be expected that he fhould withhold his credit from the florefcence of the *Fucus*, when brought to light by one of the moft refpectable philofophers of his day? The florefcence however of the *Fucus*, as it is ftated in the *Nereis Britannica* to exift, derives no fupport from that of the fubmerfed plants. On the contrary, the latter tend to eftablifh a ftrong argument againft the abovementioned theory. Almoft all thofe aquatic plants that are fertilized by actual pollen, a fubftance known to be immifcible with water, emerge at the time of their impregnation. Let us examine, as next in fucceffion, the very few which do not emerge. And firft the *Ifoetes* feems to prefent itfelf, whofe flower

is

is ſo carefully enveloped with an impenetrable barrier, formed by the concave poſition of the leaves, that the pollen is enabled to convey its fertilizing vapour in an element, which by contact would obſtruct the progreſs of fecundation. The genus *Chara* ſeems to indicate an approach towards that terminating point, where the mechanical floreſcence ceaſes at length to act. Some reſpectable authors, and Haller among the number, do not admit that the ſuppoſed antheræ can be inveſted with the faculty of impregnation, becauſe they are permanently included in an impervious part of the plant. Hedwig, who has defined the floreſcence of this genus with great preciſion, acknowledges himſelf to be totally at a loſs to account for that operation, becauſe the ſpherical veſſel, in which the antheræ* are included, has no external communication with the approximating germ. It is very probable, however, that the veſſel alluded to may, from its contiguity to the lower part of the germ, convey thither, at the point of contact, the impregnation by an internal proceſs. A very ſlight compariſon will at once diſcover the total want of ſimilitude in ſtructure, ſituation, and œconomy, between the veſſels of the *Chara*, in which the fecundation appears to be carried on internally, and thoſe air-bladders in ſome of the *Fuci*, ſuppoſed to be the reſidence of the male flower.

Enough has already been ſaid upon the Linnean ſtate of floreſcence. We have a clear and reſtricted definition of its conſtituent parts, while its laws are found to accord with ſurpriſing uniformity through all the various claſſes, which were formed by the great founder of the ſyſtem. Yet there is a point where its accuſtomed mechaniſm ceaſes to act; where the nature and agency of its impregnating powers undergo a material change. And here ſurely we may pauſe, to contemplate the verſatile power by which Nature is

* *Theor. Hedw.* p. 129.

enabled

enabled to vary, without difuniting, the general principles of her eftablifhed laws. "She difdains," as Mr. Lightfoot has finely obferved, "to be limited by the fyftematic rules of human invention. She never makes any fudden ftarts from one clafs or genus to another, but is regularly progreffive in all her works, uniting the various links in the chain of beings by infenfible connections."

We have lately feen this myfterious fubject difcuffed by no ordinary inveftigator of Nature's laws*. The principle upon which this difcerning naturalift proceeds, appears to be well founded; and if he fails in any refpect, it is by overftraining his theory to make it quadrate with the Linnean doctrine of florefcence. From this circumftance principally, he has, in my opinion, expofed his argument to fome objections which may not eafily be removed. He commences his effay with a concife and perfpicuous furvey of the exifting theories laid down by Reaumur, Gmelin, and Gærtner. And as the two laft of thofe authors maintain that a very numerous branch of the *Algas* do not in any inftance derive their origin from feeds, but folely from proliferous gems, or buds, he oppofes the doctrine with much ingenuity; not grounding his opinion merely upon the laws of analogy, but upon a fcientific and an anatomical inquiry into the natural ftructure and conftituent parts, as well as fituation, of thefe corpufcles.

Having, as far as the nature of the fubject would admit, eftablifhed thefe points fo confonant with found philofophy, he proceeds to account for that peculiar procefs to which the feeds themfelves owe their origin; and this he confiders as an actual ftate of florefcence. "If pollen," continues this author, "under the fhape of farina, be unfit for fecundation in the water; if Nature has taken

* Mr. Correa de Serra on the Fructification of the fubmerfed *Algæ*, in The Philofophical Tranfactions for the year 1796, p. 494.

a particular

a particular care to guard this operation from the preſence of that element; if pollen can exiſt in an active ſtate under a mucous appearance; and if the antheræ of perfectly ſubmerſed flowers are nothing elſe than cloſed veſſels filled with mucous pollen; what doubt can we entertain, that the mucilaginous veſicles of the ſubmerſed *Algæ* (which contain alſo their ſeeds) are antheræ?"

I ſhall now briefly conſider this theory of floreſcence, as taken up upon the principles eſtabliſhed by Linnæus, and explained in the technical language of that author. It may perhaps ſcarcely be worth while to obſerve, that Mr. Correa de Serra, at the beginning of the above paſſage, appears to make a diſtinction between the terms *pollen* and *farina*, which in fact are merely ſynonymous. Pollen, as explained by Linnæus in the *Philoſophia Botanica*, ſeems to have a reference to the exterior form and appearance of the body itſelf, more than to the fecundating vapour or power contained within it, to which it acts principally as a vehicle *. This part of the flower being almoſt univerſally found under a farinaceous form, is diſtinguiſhed by the appropriate term *pollen*, which implies a fine meal. Waving therefore any objection that might be raiſed againſt the expreſſion "mucous pollen," I cannot paſs over a ſubſequent remark, in which the faculty of impregnation is attributed to the part containing the ſeeds; and the province of the antheræ, ſo diſtinctly preſerved in the ſexual ſyſtem, is nearly blended with that of the ſeed-veſſel. The paſſage alluded to is the following: "What doubt can we entertain, that the mucilaginous veſicles of the ſubmerſed *Algæ* (which contain alſo their ſeeds) are antheræ?" In ſhort, if the reproduction of theſe plants is to be elucidated by the Linnean theory of floreſcence, and its concomitant terms, eſpecial care ſhould be

* Generationem vegetabilium fieri mediante pollinis antherarum illapſu ſupra ſtigmata, quo rumpitur pollen, efflatque *auram ſeminalem*, quæ abſorbetur ab humore ſtigmatis. *Ph. Bot.* ſect. 145.

 taken

taken to preferve a ftrict connection, and uniform correfpondence, between the parts defcribed, and the definitions by which the theory is fupported. Gærtner, in his remarks upon fome of the *Fuci*, finding that their fecundation was effected by an internal procefs, maintains likewife, that the part containing the feeds is alfo endued with the faculty of impregnation. But this author gives an unphilofophical and a fanciful caft to his hypothefis, in adopting an unifexual diftinction, when he fuppofes that the female organ impregnates itfelf, or rather, the ovula which it contains——"quod ipfe uterus fua fœcundet ovula, et quod ille ipfe officia genitalium utriufque fexûs, præftet folus."——Upon examining the mucilaginous veficles (or, ftrictly fpeaking, the diftended fummits) in which the feeds are placed, and confidered alfo by Mr. Correa de Serra as the antheræ, it will appear that the feeds are very feldom fixed in a loofe and naked ftate, but contained in minute hard coriaceous tubercles, on all fides impervious*, and moft firmly attached to the interior furface of the fummit, in the veficular *Fuci*; and that in thefe tenacious tubercles the feeds may frequently be difcovered long before the folid cellular mafs becomes changed into a mucilaginous fubftance. Again, in feveral fpecies, the central fubftance, in which the feeds or pericarps are placed, always remains in an invariably folid ftate, and is never converted into mucilage. This is decidedly the cafe in the *Fucus ferratus* †, and I never found it otherwife in the *Fucus nodofus* and fome others; and yet the feeds of both thofe plants are produced in the fame manner as in the *Fucus veficulofus*. From thefe facts there is great reafon to conclude, that the mucus, which is found at certain feafons in feveral of the *Fuci*, is not effentially neceffary to their impregnation. And as it feems to abound moft in

* See the horizontal fection of one of the fummits of *Fucus veficulofus*, in which the tubercles or pericarps are reprefented. *Vell. Marine Plants*, plate 1.

† See an horizontal fection of this *Fucus* magnified, *Marine Plants*, plate 1.

the

the mature plants, I am induced to ſuppoſe that it may be a kind of ſuppuration brought on by age, and poſſibly may be inſtrumental in facilitating the eſcape, or diſperſion, of the ſeeds.

A plauſible remark in favour of the hypotheſis is urged by the ingenious author in the following words: "The pollen of any flower, when put into water, in a very ſhort time begins to move; and its particles agitate themſelves in every direction, perfectly reſembling the moſt lively animalcula. Their activity in this ſtate laſts ſome time; but if the leaſt quantity of ſalt be put into the liquor, death quickly enſues, from which they never more recover. This incloſed mucilaginous fructification was therefore the only one which could enſure exiſtence to vegetables living chiefly in ſea-water, with which their mucus is found to be immiſcible."

It is very far from my intention to miſrepreſent the meaning of the paſſage. It ſtrikes me, as alluding to a proviſion which Nature has made to protect the impregnating body from the deleterious effect of ſaline particles (which would at once deſtroy the active principle of pollen), by fixing it in a menſtruum which is immiſcible with ſea-water. The ſuppoſition is ingenious. Yet is Mr. Correa de Serra aware, that this very mucilage is not free from the infection of ſalt;—that ſaline particles may frequently be found upon the ſurfaces of dried ſpecimens;—that in diſſections under the microſcope ſimilar appearances may be diſcovered, which ſuddenly ſhoot into minute cryſtallizations;—and that it is owing to this ſaline quality which ſeems intimately combined with the very texture and conſtituent parts of the *Fuci*, that they poſſeſs the property of an hygrometer for years after they are dried*?"—From theſe circumſtances it

* I am induced, from an obſervation of Mr. Lightfoot, to attribute this circumſtance to the natural quality of the frond, rather than to the effect of the ſea-water in which it grew. That author remarks, that if the *Fucus ſaccharinus* be ſoaked in freſh water, then dried

it appears to be highly probable, that the pollen of marine plants, if ſuch a body in reality may exiſt in the mucilage, muſt be totally different in its quality from the pollen which carries on ſo important a function in the ſexual ſyſtem: it muſt alſo be totally different in its ſubſtance, becauſe it is not to be diſcovered by the greateſt magnifying powers.

But, giving the utmoſt ſcope to the hypotheſis, and admitting that this mucous pollen is attendant upon all the marine plants, either internally or externally; ſtill it muſt contain ſome ſubtile vapour, capable of paſſing through the coriaceous texture either of the tubercular pericarps or of the frond. And after all, what does this amount to? Nothing more than that ſome undefined vivifying principle, reſident in the internal ſubſtance of the plant, brings on a ſtate of impregnation, and anſwers every purpoſe which the more obvious mechanical laws of floreſcence produce externally in an atmoſphere, where no impediments exiſt to render their proceſs abortive.

After what has been already advanced, it may appear almoſt ſuperfluous to produce any further arguments againſt the floreſcence ſuppoſed to be concealed in the inflated parts of the veſicular *Fuci.* I ſhall therefore only briefly add, that the *Fucus ſerratus* is entirely deſtitute of the air-bladders, and yet produces its fructification in a ſimilar manner to the *Fucus veſiculoſus*; but the advocates for floreſcence may attribute the impregnation to the ſmall external filaments ſo often noticed. *Fucus ſiliquoſus* and *F. nodoſus* are perfectly free from thoſe minute faſcicles; but then again the impregnation may poſſibly be aſcribed to the tracheæ in the veſicles or inflated leaves. What then remains to be ſaid of the *Fucus canaliculatus*, which

dried in the ſun, and afterwards depoſited, it will in a ſhort time be covered with a white efflorescence of ſea ſalt.

which is entirely deſtitute both of the veſicles and the external filaments, and yet produces its ſeeds in a manner exactly ſimilar to that before deſcribed ?——In ſhort, as the means by which Nature conducts her operations are always appropriate to her ends, we may conclude, that if the fine veſſels or fibres in the veſicles had any immediate reference to a ſtate of floreſcence, they would either be extended throughout the internal ſubſtance of the frond, to carry on their ſecret and ſubtile operation ; or would be furniſhed with ſome external apparatus, which might give colour and ſupport to the hypotheſis.

A particular deſcription of the air-bladders, or veſicles, which form a curious part in the ſtructure of ſeveral of the *Fuci*, will cloſe theſe remarks. It might naturally occur to any caſual obſerver, that the veſicles alluded to could not be formed, if they had not ſome means of collecting and retaining a greater portion of air than that which may exiſt in an equal given ſpace of the ſolid frond. Nature therefore ſeems to have furniſhed them with numerous tracheæ or air-veſſels, ſurpaſſing in tenuity the fineſt hair. Theſe are a combination of fibres inoſculated together, which proceed from the cellular ſubſtance, and freely exert their elaſtic influence from the interior ſurface of the cavity. They may be found in all the inflated *Fuci* ; and as they are very ſimilar in their appearance, ſo, probably, they may be in their œconomy, to that fine woolly ſubſtance which is found at the broken ends of ſome leaves, and which the learned Grew has pronounced to be a ſkein of air-veſſels. Theſe capillary veſſels in the bladders of the *Fucus* probably contribute their aid to dilate and extend that part of the frond into its oval and veſicular form ; and bring part of that elaſtic fluid into action, which is well known to exiſt in all plants without exception. Since this paper was written a remark has made its appearance, in a very valuable

work

work upon the ſubject of the *Fuci**, which attributes the formation of thoſe fine veſſels to the laceration of the internal ſubſtance, as the ſides become dilated into the air-bladders. An examination of theſe ſlender threads under the microſcope will probably induce the obſerver to entertain a different opinion. If they originated from the cauſe ſuppoſed, they would appear in a lacerated unconnected ſtate; and, being formed from the broken maſs, could never be ſo curiouſly anaſtomatiſed one with another: neither would the relaxed and diſſolved contents be drawn out into tubular and jointed forms. Beſides, theſe capillary veſſels generally dilate at the point of inoſculation, forming a kind of joint, in an uniform manner. It is very difficult to conceive that a texture ſurpaſſing in tenuity the fineſt web, and at the ſame time ſo curiouſly organized, ſhould be produced by a general revulſion of the expanding maſs.

* See *Tranſactions of the Linnean Society*, vol. iii. p. 91, 92.

XVI. *De-*

XVI. *Description of Sowerbæa juncea, a Plant of New South Wales.*

By James Edward Smith, M. D. F. R. S. P. L. S.

Read July 2, 1799.

THE eſſential character of the genus of *Sowerbæa* is already publiſhed in the fourth volume of the Linnean Society's Tranſactions, p. 218, as follows:

Corolla infera, hexapetala. *Filamenta* tria, biantherifera, ſterilibus tribus interſtinctis.

It belongs to the Order of *Aſphodeli* of M. de Juſſieu, and ſhould be arranged in the ſame ſection with *Allium*. One part of the character of that ſection, *radix bulboſa*, requires however to be omitted, as being neither neceſſary to diſcriminate *Allium*, nor applicable to the genus before us.

Sowerbæa is ſtrikingly diſtinguiſhed from every plant of the ſame natural order by having two antheræ upon each filament, each of which conſiſts of two cells, and burſts by two pores at the top. Between the filaments which bear antheræ, three ſhort blunt barren ones are inſerted. The antheræ ſeparately conſidered agree in ſtructure and manner of burſting with M. de Lamarck's genus of *Dianella*, *Juſſ. Gen.* 41; but in that each ſtands on its own filament, and the fruit moreover is a berry.

In the Linnean Syſtem *Sowerbæa* muſt be placed between *Aphyllanthes* and *Allium* in *Hexandria Monogynia*; for every analogy, as well

well as the structure of its parts, proves it to be truly hexandrous, though at first sight it might seem triandrous.

We are as yet acquainted with but one species of this genus, discovered by Mr. White near Port Jackson in New South Wales, and now not unfrequent in the nurseries about London. It requires the shelter of a greenhouse, and thrives best in bog earth with a considerable degree of moisture. It may be named

SOWERBÆA JUNCEA.

Root of many long simple fibres.

Herb smooth.

Leaves radical, sheathing, upright, linear, sharp-pointed; channelled above; convex beneath.

Stipula within the leaf, simple, white, membranous, obtuse, concave.

Stalk solitary, taller than the leaves, erect, simple, naked, round, smooth, solid.

Umbel terminal, many-flowered, spreading.

Bracteæ several, ovate, coloured, shorter than the umbel.

Flower-stalks simple, thread-like, single-flowered, naked.

Calyx none.

Petals six, equal, ovate, pale purple, spreading, permanent.

Filaments smooth, greenish.

Antheræ yellow.

Germen superior, roundish, smooth, with three principal furrows and three smaller intermediate ones.

Style erect, rather longer than the stamina.

Stigma simple.

Capsule

Sowerbaea juncea

Capſule of three cells and three valves, the partitions from the middle of the valves.

Seeds one or two in each cell, angular, blackiſh.

The herb when bruiſed has no peculiar ſmell, and is totally deſtitute of any flavour of garlick. The flowers alſo are without ſcent.

TAB. VI. repreſents the *Sowerbæa juncea* of its natural ſize.

Fig. 1. The ſtamina and piſtillum.
2. 2. Barren filaments.
3. Germen and ſtyle.
4. Capſule magnified, cut tranſverſely.
5. A ſeed.

XVII. *An Account of the Fructification of Lycopodium denticulatum.*

By Felix Avellar Brotero, Professor of Botany in the University of Coimbra, F. M. L. S.

Read July 2, 1799.

LYCOPODIUM DENTICULATUM.

L. FOLIIS imbricatis, ovatis, mucronatis, caulibus repentibus, dichotomis ramofiffimis; fpicis affurgentibus, monoicis.

L. foliis bifariis, fuperficialibus imbricatis; furculis repentibus, floribus fparfis. *Linn. Syft. Veg.*

Mufcus denticulatus et fœniculatus Dalechampii. *Grifley Vir. Luf.* n. 1041.

Mufcus terreftris Lufitanicus. *Cluf. Hift.* 2. *p.* 249.

Idem. *J. Bauh. Hift. Pl. vol.* 3. *p.* 757.

Mufcus denticulatus minor. *Bauh. Pin. p.* 360.

Lycopodioides imbricatim repens. *Dill. Mufc.* 462. *t.* 66. *f.* 1. A.

Lycopode denticulé. *Lamarck Encycloped. Meth.*

GERMINATIO. *Radicula* unica, fimpliciffima, capillaris, uncialis, pubefcens, enata prima ex hilo trihiulco, feu ex bafi fubtrivalvi integumenti feminis aperta. Cotyledones duæ, ex vitello evolutæ, oppofitæ, obovatæ, glabræ, patentes, femilineam latæ, unam

lineam longæ: ſcapus medius inter vitellum intectum et cotyledones evolutas, capillaris, glaber, erectus, tres lineas longus. Paucis exactis diebus, plumula apparet bifolia, foliolis ſublanceolatis, inter cotyledones decuſſatim oppoſitis; poſtea ad plumulæ ſinguli folioli baſin aliud ſimile exoritur, atque ex iſtorum duorum medio tertium alterum utrinque demum progerminat, quod ſenſim in ſurculum foliatum protenditur, ſicquè ſcapus primordialis bifurcus tandem fit. Integumentum ſeminis cum vitello trihiulcum perſiſtit quoad uſque duo prædicti ſurculi ſeſquiuncialem longitudinem adipiſcantur. Decembri aut Januario in humo umbroſâ germinat.

Surculi ſetacei, ſubanguloſi, ſubſtriati, repentes, dichotomi, ramoſiſſimi, foliis tecti, tres ad ſex uncias longi, biennes, triennes et ultra, æſtate areſcentes, autumno humiditate revireſcentes; ramis ex gemma compoſita axillari exortis, patentibus, aut divaricatis; radiculis ad ramorum bifurcationes ſolitariis, ſetaceis, infernè dichotomis.

Folia omnia alterna, glabra, ex pallido-viridia, ſeſſilia, mucronata, obſoletè decurrentia, aliqua poſtice ad baſin gibboſiuſcula, ciliato-ſerrulata, denticulis minimis acutiſſimis (lente vitreâ conſpecta). In ramulis non fructificantibus quadrifario-ſecunda; lateralia, ſeu ſolo applicata patentia, contigua, ovata, acutiuſcula, plana, paulo ultra lineam unam longa, pauloque ſemilineam lata; ſuperficialia ovato-lanceolata, acutiora, triplo fere minora, obliqua, laxè imbricata; in dichotomiis ad radicularum exortum unum conſtanter ſolitarium, inferum. In ramulis fructificantibus quadrifariam laxè imbricata, alia etiam majora, minora alia, ovato-lanceolata, omnibus aliis acutiora, baſi concava, apice reflexo.

Ramuli fructificantes terminales, adſcendentes, ſæpius gemini, ſpicati, ſ. quaſi amenta. Flores axillares, ſolitarii, monoici.

 Peri-

Perichætium et *calyptra* in utrifque floribus nulla.

Flores masculi ad ramorum apices plurimi, ad viginti fex et ultra, inferne pauculi inter fœmineos nonnullos, feu interdum cum ipfis alternantes, fuperioribus præcociores. Anthera axillaris, feffilis, folitaria, obtufa, ex reniformi-cordata, primùm ex pallido-viridis, feu fubrufa, demum faturate teftacea, piftilli germine valde minor, unilocularis, bivalvis, (ut in Callitriche vernâ) calore, non vero humiditate verticaliter dehifcens; valvulis æqualibus, ovato-fubcordatis, elaftice pollen ad latera vibrantibus, diaphanis, valde porofis: grana pollinis numerofiffima, ad tercenta, fubæqualia, fubglobofa, acutiufcula, lutefcentia, colore ceræ, folida, minime neque ficcitate neque in aqua dehifcentia, elaftice defilientia, ad candelæ flammam a me applicata non inflammabilia.

Flores fœminei ad ramorum extremorum inferiora, aut interdum fub eorum bifurcationibus permulti, fed mafculis fæpius numero minores, folitarii, axillares, feffiles. Germen ovatum, fubtriangulum, obtufum, læve, nitidum, pedicello capillari minimo vix confpicuo adhærens, foffulis nonnullis, punctifque tuberculofis minimis, fucculentis, vagis inftructum. Stylus nullus. Stigma: rima, feu fulcus profundus in germinis bafi, qua folio incumbit, utrinque ad latus pedicelli, liquore unctuofo diutiffime perfufus, indies largior, perfiftens. Ovula etfi grandefacta adultaque oleo craffo plena, quod ferò demum in vitellum folidum convertitur.

Capfula fubfeffilis, pedicello minimo capillari, non in bafeos centro, fed hinc verfus folium fito, impofita, trigona, feu conico-tricocca, obtufa, bafi hinc verfus folium emarginata, ex pallido-viridis, unilocularis, quadrivalvis, elaftice per futuram finûs inter femen fuperius et aliud oppofitum rachi incumbens lateraliter dehifcens: valvulæ diaphanæ, bafi coalitæ, (ad microfcopium porofæ, papillofæ) duæ majores concavo-convexæ, margine revoluto, ovatæ,

 obtufæ,

obtusæ, oppositæ; duæ aliæ triplo minores, oppositæ, majores decussantes, carinatæ, acutiusculæ. Quæ capsulæ ad ramulorum inferiora sitæ sunt, citius maturescunt ac dilabuntur.

Semina constantissime quatuor, globosa, parietibus valvularum incumbentia, hili triangularis apice ad tuberculum minimum in capsulæ fundo, quâ pedicellus desinit, situm laxe applicata; tria inferiora, quartum superius ipsis impositum; inferiora duobus hili angulis lateralibus inter sese cohærent, et tertio interno angulis tribus quarti seminis superioris affiguntur; omnia elastice desiliunt. Integumentum simplex luteo-sulphureum, sub-coriaceum, (ad microscopium) scabriusculum: albumen embryonem involvens nullum, sed vitellum globosum, integumenti magnitudine: embryo, seu plantula seminalis, vix conspicitur. Semina plurima abortiunt; duo sæpius paulo majora, fertilia, unum aliudve ex quatuor interdum exsuccum demum evadit.

Floret autumno, hyeme et primo vere.

Habitat ad aggeres umbrosos, subhumidos passim prope Conimbricam, ubi jam olim a celeb. Clusio observatum, et alibi in Beira et Extremadura.

Tota planta inodora et insipida est, quamvis a nonnullis leviter dulcis et astringens habita fuisset. Semina fertilia aquæ fundum petunt; omnia nitrosa, oleosa, fulgurantia, ut illa Lycopodii clavati, quibus esse viribus medicis analoga probabile est.

Linnæi opinio, qui fulgurantia semina pro polline, et surculorum gemmas in Lycopodiis pro pistillis et fructu habebat, jamdudum explosa. Illust. Gærtner nullas antheras, sed semina duplicis formæ in eadem stirpe Lycopodia sæpe ferre, atque aphroditas plantas esse contendit.

Celeb. Adanson etsi Lycopodiis antheras et pistilla, seu capsulas, stylo

ſtylo ſtigmateque nullis, tribuat, attamen capſulas polliniferas cum feminiferis, ſeu fructum cum antheris confundere videtur, nam ſemina fulgurantia pro polline habet, ipſaque monocotyledonea exiſtimat, quod ex noſtri affinitate ſpecificâ non admittendum cenſeo. Clariſſ. Juſſiæus, De Lamarck, Schreber et alii ex recentioribus Botanicis nullam inter polliniferas et ovuliferas, ſeu ſeminiferas capſulas diſtinctionem ex ſtructura partium aliiſque botanicis notis deſumptam dederunt. Cæterum quod ad noſtrum Lycopodium denticulatum attinet, ortus, color, tempus florendi, ſitus, fabrica, commercium cum fœminis clare indicant capſulas illas ſubreniformes, corpuſculis ad tercenta plenas, verarum antherarum requiſita poſſidere, et ad veras antheras eſſe referendas. Ovaria, ſeu piſtilli germina et ovula ipſa ſemper longo temporis intervallo antheras et pollinis formationem præcedunt: inferiora priuſquam ſuperiora (ſicuti etiam antheræ) evolvuntur et matureſcunt. Cum in omnibus vegetabilibus, etiam e perfectorum tribu, non una eademque ſit organorum ſexualium, ſtigmatis polliniſque conformatio, (nam ex. gr. in Agyneja ſtigma eſt foraminulum in germinis apice ſexcrenatum, et in nonnullis Orchideis, Contortis, &c. pollinis granula ſolida ſunt) nil ſane mirum emarginaturas pro ſtigmate taliaque pollinis granula Lycopodio noſtro a natura donari. Antheræ illæ pauculæ, quæ inferne inter prima ovaria ſitæ ſunt, priores pollinis granula explodunt; iſtorum aliqua in aerem et per ipſum ad vicinarum ſtirpium co-ſpecificarum ſpicas, alia ſupra germina propriora aut remotiora, alia in axillas foliorum et ſupra folia ipſa, unde ad ovariorum emarginaturas, ubi diu perſiſtunt, inferiorum deſcendunt: tunc ſperma tenuis liquoris ſpecie, ex granulis excretum per inſenſibiles ſuturarum, ſeu ovarii emarginaturarum poros abſorbetur, vaſa ad tuberculum, ſeu receptaculum minimum, cui ovula adhærent, deferentia permeat, et tandem ipſa fœcundat. Non ergo impprægnationem (quæ forte nonnullis

placebit)

placebit) media abſorptione, ex pedicello antheræ minimo habita, ſpermatis, quod ſimul cum ſapâ per ſpicæ rachin ad ovarii ſinguli pedicellum deſcendat, admittere opus erit; imo id permultorum ſeminum abortio dijudicare vetat. Nec mirum tot abortiri ovula, cum planta habitet reptetque ſemper in locis ſubumbroſis et humidis, cumque ejus folia et iſtorum axillæ ſæpius aliquo rore conſpergantur, ac tandem cum perpaucæ antheræ ex ſuperioribus debito tempore aperiantur pollenque ejaculent: huic tamen natura proſpexit, ſpicis aſcendentibus copioſiſque, ovariis permultis, antheris ſummopere polliniferis et ad ſpicarum apices numeroſis; unde ſatis ſemper fertilium ad magnas in aggeribus noſtris ſegetes producendas ſeminum ſupereſt. Fateor tamen ſæpiſſime obſervaſſe antheras fere omnes, quæ in ſpicarum ſummitate proveniebant, eodem tempore, quo capſulæ aperiebantur propriores ſubtus ſitæ, aperiri, pollenque perfectum explodere: capſulis iſtis ſicut et eorum ſeminibus magnitudo erat naturalis, ſed ſemina oleo craſſo plena, (non autem ſolido vitello) integumento viridi teneroque, hilo ſimili, humido et ſurſum reverſo, cui aliqua interdum granula pollinis exploſa applicabantur; per pauca temporis momenta in capſula hianti manebant, nam citò ex ipſa ſurſum ac deorſum ad folia, aut vicinas ſpicas co-ſpecificas elaſtice deſiliebant, ubi nonnumquam in aliqua pollinis granula ejaculata incidebant. Itaque cum non veriſimile ſit iſta tot innumera ſemina omnia aborta, facile crederem nonnulla ſive ex propria ſive vicina alia planta co-ſpecifica granulis alicujus antheræ exploſæ jam fœcundata fuiſſe. Nonnulli fortaſſe hilum triangulare pro vero ſtigmate ſument, et fœcundationem ovulorum in iſta planta eodem, quo in piſcibus et quibuſdam aliis animalibus, modo fieri contendent, nempe per ſpermatis applicationem ovulis adultis, ſeu extra ovarium poſitis, maxime in eo innixi, quia ſemina nulla iſtius Lycopodii ſolida evadant, niſi poſteaquam ex capſulis elaſtice deſilierunt, et quia

eorum

eorum integumentum hilo trifido tridenteoque in germinatione conſtanter aperiatur. Quamvis autem hæc opinio non improbabilis eſſe videatur, attamen cum ovula medio ſtigmate externo ovarii, quod deſcripſi, fœcundari poſſint, aliud admittere non opus eſt, præſertim quia in nullis ſeminibus uſque adhuc in regno vegetabili notis fœcundatio in ſtatu integumenti proprii adulto unquam obſervata fuit. Quidquid vero ſit, illa quatuor corpuſcula in capſulis conico-tricoccis contenta eſſe ſemina, et alia in capſulis reniformi-cordatis eſſe pollinis granula ſat ex ſupradictis evidenter colligi poſſe cenſeo. Quapropter clariſſ. Gærtneri opinio*, qui pollinis corpuſcula eſſe granula ſeminalia diverſæ ab aliis ejuſdem ſtirpis ſeminibus formæ credit, admodum a vero diſtat. Nam inſuper, cui bono tot ſeminalia granula, ſi nunquam ex illis novellæ plantæ prodeunt? Ad aggeres Conimbricenſes autumno et hyeme numeroſas ſegetes Lycopodii noſtri pluries obſervavi, nuſquam tamen unum ſaltem ex ſexcentis, quæ in germinationis ſtatu avulſi, individuum inveni, quod ex corpuſculis pro ſeminibus minoribus a clar. Gærtnero admiſſis (a me autem pro veri pollinis granulis) prodiret, imo omnia ex majoribus, ſive veris ſeminibus, prout ſupra dixi de hujus noſtræ ſtirpis germinatione agens, conſtantiſſime progerminare vidi, cum illa jam in humum putridam redacta eſſent, quoniam ut obſervavi, poſtquam vera officia maſcula reddidere, corrugantur, marceſcunt, contabeſcunt. Igitur probabile eſt Lycopodii ſpecies ad Monœciam alias, nonnullas vero ad Diœciam referendas, quod autoptis decidendum relinquo; noſtrum conſtantiſſime monoicum eſt.

* Agmen denique claudat Lycopodium, quod ſæpe in eadem ſtirpe duplicis formæ ſemina; et præter hæc, foliaceas quoque gemmas, ſeminibus perperam annumeratas, producit. *J. Gærtner De Fruct. et Semin.* vol. 1. Intro. pag. xxv.

XVIII. *De-*

Conferva umbilicata.

XVIII. *Description of Conferva umbilicata, a new Plant, from New South Wales.*

By Lieutenant Colonel Thomas Velley, F. L. S.

Read July 2, 1799.

CONFERVA UMBILICATA.

Conferva fronde dilatata filamentis reticulatis, centro radicali.

TAB. VII.

THIS ſingular vegetable production was diſcovered by accident on the ſtem of a large *Fucus* from New South Wales *.—After having placed the latter in water for the ſpace of three or four days, a very fine filmy ſubſtance was obſerved floating cloſe to the ſtem, which immediately collapſed, and was ſcarcely diſcoverable when the *Fucus* was taken out of the veſſel. Upon a more minute inveſtigation, two or three ſeparate plants were found ſtrongly attached to the ſtem; all of which, from their extreme tenuity, were in ſome degree torn.

The frond of the largeſt might be between three and four inches diameter; it probably was of greater extent in its perfect ſtate, and ſeemed to favour a circular mode of growth. The baſe is ſomewhat central, and from it proceed two or three apparently

* Sent by Governor Hunter, who very laudably made a collection of plants for the purpoſe of promoting Natural Hiſtory.

 membra-

membranaceous leaves, giving the frond the form of an umbilicated *Ulva.* Under the microſcope ſeveral cylindrical ſtems, not larger than a hair, were found to diverge ſuddenly in different directions, producing ſimilar ramifications in diſtinct whorls at ſmall diſtances, and carrying with them innumerable reticulated ramules combined together in all directions; ſome of which ſeemed in a ſmall degree to favour a circular tendency: the whole forming a moſt beautiful web of cylindrical filaments, far exceeding the fineſt lace, and ſetting at defiance the utmoſt art of the pencil. The interſtices do not retain any regular or prevailing form throughout, as they appear to do in the *Conferva reticulata*; but are united with each other in the manner above mentioned.

Two circumſtances are to be obſerved in the ſtructure of this plant. Firſt, the ramules, however varied in their direction, unite with the main ſtems at regular joints; while the ſeparations, or diaphragms, as they are generally called in the *Confervæ*, are evidently apparent at thoſe points of union. Secondly, between the interſtices ſmall ſubacute ſpinules frequently appear. Hence I was induced to conſider this vegetable production, however ſingular in its mode of growth, as a real *Conferva.* As the ramifications brought to my mind the veins of a leaf, I at firſt examined it under a notion of its being the ſkeleton of ſuch a body, after it had been diveſted of its cellular ſubſtance: but as this web ſo greatly ſurpaſſes in tenuity any of thoſe appearances, I conclude it could never have continued in ſo diſtinct and organized a ſtate, if its preſent form had been owing to an anatomical proceſs, which ſometimes accidentally takes place in decayed leaves.

The filaments, ſeparately viewed, were tranſparent, but contracted a degree of opacity at the joints. The whole plant, from the cloſeneſs of its texture, when taken in the maſs, has a ſombre green tint.

XIX. *Ob-*

XIX. *Obſervations on the Britiſh Species of Mentha.* By *James Edward Smith,* M.D. F.R.S. P.L.S.

Read March 5, 1799.

NO Britiſh genus of plants, except perhaps *Conferva*, has been hitherto leſs underſtood than that of *Mentha;* either with reſpect to its ſpecies, and the principles upon which their diſtinctions ought to be founded, or the ſynonyms of thoſe ſpecies in the moſt recent, as well as the more ancient writers. Dillenius in his edition of Ray has truly obſerved, that England is peculiarly fertile in mints; but he confeſſes, notwithſtanding all he had in that edition added to thoſe of Ray, there ſtill remained ſome deſcribed by Merrett, and others obſerved by Buddle and Rand, which he found himſelf obliged to leave for future enquiry.

In entering upon this difficult diſquiſition, it naturally divides itſelf, if I may be allowed a ſcholaſtic formality, into two parts: firſt, it will be found neceſſary to conſider how preceding authors have treated it; and ſecondly, to enquire how it may be made more intelligible in future.

I. In treating of the genus of *Bromus* in our fourth volume, I found it not requiſite to go farther back than the works of Ray. In the preſent inſtance Merrett's *Pinax*, and indeed a ſtill more ancient work, the *Phytologia Britannica* of Dr. How, publiſhed in 1650, a work which eſcaped my recollection in writing the paper on *Bromus*, both require to be noticed.

 Theſe

Thefe publications were compofed upon the plan which Ray afterwards followed. The authors enumerated every Britifh plant, to the beft of their knowledge, not indeed fufficiently difcriminating truly wild from exotic fpecies, and arranged them alphabetically under one or more denominations, taken from any author that came in their way. Their works are therefore equally deficient in fyftem, and uniformity of nomenclature; for neither had been thought of in thofe days, at leaft in this country. Ray introduced a fyftematic arrangement, but was ftill indifcriminate in the books from which he took his fynonyms, choofing, from any quarter, what beft expreffed the plant he meant, or probably adopting fuch as happened to be in the moft general ufe. Hill and Hudfon firft difpofed our native plants under the uniform nomenclature of one writer, Linnæus; the former indeed only as far as the genera were concerned, the latter with refpect to both genera and fpecies. How much is it to be regretted that, inftead of beftowing his talents in building a fyftem, which, however learned and ingenious, is now fuperfeded by a more eafy one, Ray did not undertake to define by words what he fo well underftood, the fpecific differences of plants! We fhould then have quoted him with certainty in every inftance; whereas, if he fhould now have chanced to miftake a fynonym, we are led into an error, unlefs we happen to know certainly the plant he muft mean, and can judge for ourfelves, as well as he could, of the propriety of the fynonym. Fortunately fuch miftakes in Ray are very rare, but they fometimes occur. Hence it is neceffary to obferve that, though in quoting Ray, Merrett, How, or Dillenius for any plant, we are obliged to name it by the denomination of fome prior writer, under which they have placed it in their books, we never anfwer for its being the plant intended by that writer. If we *believe* it to be fo, we quote him exprefsly; if we certainly *know*

it,

it, we quote the Herbarium or ſpecimen on which our knowledge is founded. So in quoting Linnæus, we only anſwer for his own names, and by no means for any of his ſynonyms; for I am ſorry to ſay he is in that department more incorrect than moſt other writers, even in his moſt accurate and ingenious *Flora Lapponica*, and very much ſo in his laboured *Hortus Cliffortianus*. Dillenius has made many ſimilar miſtakes, and the works of Haller abound with them. How ill-adviſed therefore are thoſe who copy ſynonyms from any author without examining them! This is a truth I have often inculcated, but it cannot be too ſtrongly enforced. Let thoſe who think it unimportant purſue with me the hiſtory of the Britiſh Mints.

Dr. How enumerates 8 ſpecies of *Mentha* and *Menthaſtrum*, including *Calamintha aquatica* and *Pulegium*. One of theſe, "The great curled Mint of Germany," *Mentha criſpa Danica aut Germanica ſpinoſa*, has never been ſuppoſed to be Britiſh, and is left out even by Merrett. Another is the Cat Mint, *Nepeta Cataria* of Linnæus. The 6 remaining ſpecies I find no difficulty in aſcertaining, and ſhall quote in their proper places.

The *Pinax* of Merrett contains 11 ſuppoſed ſpecies of Mint, two of which belong to *Mentha Pulegium*, a third is *Nepeta Cataria*, another (*Calamintha aquatica*) is *Mentha arvenſis*. Five of the remaining ones are marked with an aſteriſk as being added by himſelf to the liſt of Britiſh plants, and of theſe the 4 laſt are as unintelligible to me as to Dillenius, nor do I know how they are to be aſcertained. I ſhall tranſcribe all Merrett ſays upon the ſubject.

" *Mentha* odorata flore cineritio. Five miles from Glouceſter, in the way to Hereford.

" *Mentha* Balſamita vel latifolia odorata. In the way betwixt Pemſey and Lewes in Suſſex. Diutiſſimè durat odor ejus ſuaviſſimus.

" *Mentha*

" *Mentha* incana fœtida.

" *Menthaftrum* valde ramofum flore violaceo rubro. At Dartford in Kent."

It is moft probable that all thefe are referable to fpecies we are acquainted with; but the above characters are too flight to determine them by, neither would I venture to decide upon them without feeing fpecimens. It is not my purpofe to guefs at botanical enigmas, but to inveftigate truth by the light of facts and authentic information.

The firft edition of Ray's *Synopfis* (I pafs over his earlier catalogues) contains 8 real Mints including *Pulegium*, all from that excellent writer's own knowledge, and about which there is no kind of obfcurity. They will be quoted in proper order hereafter.

In the 2d edition three more are added, but with lefs accuracy. Thefe are M. *verticillata* n. 2, which appears to me a very doubtful fpecies; M. *fpicata* n. 5, the officinal Pepper-mint; and a verticillate mint n. 6, under which laft two very diftinct fpecies are confounded, for in this inftance Ray trufted to other people.

Before Dillenius publifhed the 3d edition of Ray's *Synopfis*, botany was very affiduoufly and fcientifically cultivated in England. The genus of *Mentha* particularly engaged the attention of Buddle, the three Dales and two Bobarts. Thefe induftrious botanifts collected a great number of fpecies and varieties, and communicated to each other every thing they found, with remarks upon the properties and characters of each, and their conjectures about the fynonyms of authors. Their original fpecimens, preferved in the Britifh Mufeum, the Sherardian Herbarium at Oxford, or in my own collection, elucidated by ample manufcript remarks, have been my guides in the ftudy of this genus, which cannot be decyphered without them. The whole were fubmitted to Dillenius, who made what ufe he

chofe

those of them in his edition of the *Synopsis*, but by no means adopted or underſtood them all. What he has there inſerted, from theſe authorities or his own obſervation, is either marked with an aſteriſk or encloſed in crotchets. He has added two very bad figures, which have contributed to obſcure the ſubject. Sherard, to whom ſpecimens of all theſe plants were communicated, followed his favourite propenſity in accumulating ſynonyms for each, but not with accurate diſcrimination. Whether ſuch an undertaking may be too vaſt and difficult for any mind, or whether Sherard and Dillenius worked with too little caution, I know not; but, without detracting from their eminent knowledge and acuteneſs in other reſpects, I cannot but think it fortunate that the celebrated *Pinax* never appeared. Botany would then have been purſued by the indolent attention to ſynonyms inſtead of definitions, and would neither have been uſeful as an exerciſe for the mind, nor have led to the actual knowledge of Nature. As Buddle and Samuel Dale ſtudied plants with a view to their medical qualities, it is not wonderful that they ſhould have paid great attention to the various odours of Mints; upon which, added to the ſhape of the leaves and the different degrees of hairineſs, their ideas of ſpecies were founded. All theſe however are variable circumſtances, eſpecially the ſmell. When Linnæus took up the ſubject he likewiſe depended on the form of the leaves, taking a farther character from the ſtamina being longer or ſhorter than the corolla, and in this Mr. Hudſon and Mr. Sole have followed him. Let us inveſtigate theſe methods of diſcrimination.

Almoſt every ſpecies of Mint indeed has in its original wild ſtate a peculiar ſmell of its own, by which alone the *Mentha rotundifolia*, for inſtance, is at once known from every variety of the *ſylveſtris*; and the M. *arvenſis*, by its ſmelling like blue mouldy cheeſe, is diſtinguiſhed from other whorled mints. But many mints are capable of

of acquiring an entirely new ſmell, either by accidental variation of ſoil, a dry ſituation, or ſome change in their conſtitution which we cannot underſtand. Thus the ſmell of Sweet Baſil, *Ocymum*, is acquired by ſome, that of Orange by others, and one or two acquire a peculiarly ſweet ſmell, which belongs alſo to a ſweet variety of the Garden Thyme, *Thymus vulgaris*, called in Norfolk, where it is very common, Frankincenſe Thyme. The ſmell and taſte of Pepper Mint, which ſeem natural to our well-known ſpecies ſo named, are ſhared in common with it by ſome others, even wild in England; and the *Mentha piperita* uſed in Sweden, and deſcribed by Linnæus and Bergius, is certainly a different ſpecies from ours. Indeed I am told by thoſe who cultivate our Pepper-mint for medical purpoſes, that, to keep up its quality, the roots muſt be tranſplanted every three years; otherwiſe it degenerates into the flavour of Spear-mint, from which nevertheleſs it is ſpecifically different.

The ſhape of the leaves, though in ſome inſtances tolerably conſtant, in others is found very variable both as to length and breadth. This is particularly the caſe in the ſpiked Mints. The degree of hairineſs of the leaves, and in general of the whole plant, is extremely uncertain. I need ſcarcely ſay, colour is not at all to be depended on. Many mints expoſed to much air and ſun become altogether purple. The length of the ſtamina is alſo a variable circumſtance. As all theſe plants have creeping roots, the ſeeds are rarely perfected, and even the ſtamina frequently prove abortive. In this caſe they are commonly ſhorter than the corolla.

The infloreſcence in this and every genus has been conſidered by all authors as affording indubitable marks of ſpecific diſtinction. The mints have been divided into ſpiked, capitate and verticillate. Some very ſtriking circumſtances have led me to doubt whether even theſe diſtinctions are well founded. I am very confident the ſame

 ſpecies

ſpecies is found capitate and verticillate in the ſame meadow, though, I acknowledge, no intermediate varieties, by which we could trace their connexion, are in general obſervable; but I have ſeen one or two ſuch ſpecimens. I have ventured to mention this novel opinion in the *Engliſh Botany*, p. 448, and have converſed with ſeveral accurate botaniſts upon it. Moſt of them are ſo averſe to it, that I cannot venture abſolutely to inſiſt upon it. The following arrangement of Britiſh Mints will therefore be founded on nearly the eſtabliſhed principles of infloreſcence, but I ſhall mention wherever thoſe principles appear to me to divide a real ſpecies.

II. Having found ſo much difficulty in determining the ſpecies of *Mentha* by all the modes of diſcrimination hitherto contrived, I was ſoon convinced of the neceſſity of diſcovering ſome other principle, or of leaving the genus altogether a chaos as I found it. The experienced botaniſt well knows how peculiarly difficult it is to meet with certain diſcriminative marks between genera in very natural orders; happily it is not always equally difficult in very natural genera to trace out ſpecific characters. On the contrary, Nature generally makes ſome one peculiar part, either in the herbage or flower, ſo various in the different ſpecies, and ſo conſtant in the ſame, as to afford, to a careful inveſtigator of the ſubject, a very certain clue. Thus, the various hairineſs of the ſtamina in *Orobanche*, the ribs of the calyx in *Arenaria*, the form of the ſtigma in *Crocus*, the abſence or preſence of a nectarium in *Cuſcuta*, the ſhape of the capſule in *Fumaria* and ſome ſpecies of *Juncus*, and its ſituation in different *Saxifragæ*, the various numbers of ſtamina and ſtyles in *Polygonum*, *Phytolacca*, *Ceraſtium*, and ſeveral other genera; all theſe circumſtances, ſome of which in other inſtances afford generic diſtinctions, in the above natural genera conſtitute the beſt and moſt

 important

important fpecific ones. If I am not too fanguine, I have met with as fatisfactory a mode of determining fpecies in *Mentha* by the calyx and flower-ftalks, particularly with regard to the pubefcence of thofe parts and its various direction. This is moft peculiarly ufeful in the verticillate Mints, where it is moft wanted. In one cafe we find the flower-ftalk and bafe of the calyx invariably fmooth and naked, the upper part and teeth only of the latter being rough with hairs pointing upward; in another the calyx is all over clothed with projecting horizontal hairs; in a third it is covered with hairs which point upward, and the flower-ftalk with hairs that point downward. Thefe circumftances appear to me invariable. I have examined innumerable dried as well as living fpecimens, I have watched their growth in different foils, always with this particular object in view, and have found no reafon to alter my opinion. I do not fay the hairinefs of thefe parts never varies in degree, but even in this refpect it varies much lefs than that of any other part of the plant, except in M. *viridis*, which is a fpiked fpecies, and it never varies in direction. The utility of this fource of difcrimination will beft appear when we come to inveftigate the verticillate fpecies. I fhall therefore fay no more upon it at prefent, but proceed to a practical illuftration of the whole.

As this genus is fo perfectly natural that no one can be more fo, it will be beft, after mentioning its effential generic character, to give an account of thofe particulars in which all the fpecies agree. This will prevent ufelefs repetitions in the feparate defcriptions of each.

GENERIC

Generic Character.

MENTHA. *Linn. Gen. Pl.* 291. *Juss. Gen.* 113.

Didynamia *Gymnospermia.*

Calyx quinquefidus. *Corolla* subæqualis, quadrifida; laciniâ latiore emarginatâ. *Stamina* erecta, distantia.

Character Naturalis.

Radix repens, perennis. *Caules* ramosi, quadranguli, foliosi. *Folia* opposita. *Flores* verticillati, pedicellati, verticillis simplicibus, capitatis, vel spicatis. *Calyx* cylindricus, monophyllus, striatus, quinquedentatus, ferè regularis. *Corolla* infundibuliformis, calyce paulò longior, purpurascens. *Stamina* tubo inserta. *Stigma* bifidum, acutum, divaricatum. *Semina* quatuor, parva, sæpiùs abortiva.

Herba aromatica, resinoso-punctata, plerumque magis vel minùs pubescens.

SPECIES.

* *Spicatæ vel capitatæ.*

1. Mentha *sylvestris.*

Horse Mint.

M. spicis villosis subcontinuis, foliis acutis dentato-serratis subtùs præcipuè tomentosis, bracteis subulatis.

α, foliis lanceolatis.

Mentha ſylveſtris. *Linn. Sp. Pl.* 804. *Hudſ.* 250 α. *Hull.* 125.
M. ſpicata β, longifolia. *Linn. Sp. Pl. ed.* 1. 576.
M. ſpicata α, longifolia. *Gouan. Hort.* 279.
M. longifolia. *Hudſ. ed.* 1. 221. *Herb. Roſe.*
M. villoſa prima. *Sole Menth.* 3. *t.* 1.
M. n. 227. *Hall. Hiſt. v.* 1. 99.
M. ſpicis ſolitariis interruptis, foliis lanceolatis ſerratis ſeſſilibus. *Linn. Hort. Cliff.* 306. *n.* 1. *Herb. Cliff.*
M. ſylveſtris, longiore folio. *Bauh. Pin.* 227.
Menthaſtrum. *Dod. Pempt.* 96. *Lob. Ic.* 509. *Ger. em.* 684. *How. Phyt.* 74. *Merr. Pin.* 77.
M. ſpicatum, folio longiore candicante. *Bauh. Hiſt. v.* 3. *p.* 2. 221. *Raii Syn. ed.* 1. 79. *ed.* 2. 124. *ed.* 3. 234.

β, foliis ovatis.

Mentha ſylveſtris. *Fl. Dan. t.* 484.
M. villoſa ſecunda. *Sole Menth.* 5. *t.* 2.
M. villoſa. *Hull.* 126.
Menthaſtrum. *Riv. Monop. Irr. t.* 51. *f.* 1.

γ, Mentha candicans, foliis ſpicis et odore vulgari ſativæ ſimilis. *Doody in Raii Syn. ed.* 2. 341. *Herb. Bobart.*

δ, foliis ellipticis latis.

Mentha rotundifolia. *Sole Menth.* 9. *t.* 4.
M. alopecuroides. *Hull.* 126.
M. rotundifolia ſpicata altera. *Linn. in Herb. Cliff. at vix Bauh. Pin.* 227.

M. ſyl-

M. ſylveſtris rotundiore folio. *Bauh. Pin.* 227, *ex fide Herb. Bauh.* Haller.

M. hortenſis ſecunda. *Fuchſ. Hiſt.* 289.

Menthaſtrum ſylveſtre foliis latis. *Hort. Eyſt. Æſt. ord.* 7. *t.* 3. *f.* 2.

In ruderatis et paludoſis. Fl. Auguſto.

α and β are found in various parts of England.—γ plentiful in Kent. *Rand. Buddle in Bobart's Herbarium.*—δ in Kent and Eſſex, but rare. *Sole.* At Thorpe near Norwich, and in other parts of Norfolk.

Caules 2—4-pedales, erecti, villoſi, pilis deflexis. *Folia* ſeſſilia, ſupra incana, ſubtùs villoſa, dentato-ſerrata; in α lanceolato-oblonga; in β ovata; in γ ovata, minora, magiſque tomentoſa; in δ elliptica, latiſſima, inciſo-ſerrata. *Spicæ* terminales, paniculatæ, acutiuſculæ, villoſæ, denſæ, multifloræ, verticillis inferioribus remotiuſculis. *Bracteæ* ſubulatæ, villoſæ, floribus duplò longiores; inferiores latiores. Pili *pedicellorum* arctè deflexi. *Calyx* parvus, undique hirtus, dentibus ſetaceis, tubo longioribus. *Corolla* calyce duplò longior, incarnato-purpurea, extùs hirſuta. *Stamina* plerumque incluſa.

The firſt and ſecond varieties of this ſpecies are well known by the name of Horſe-Mint, and are not very unfrequently to be met with, eſpecially the ſecond, in moiſt or ſhady places, on the banks of rivers, or in waſte ground, orchards, farm-yards, &c. They differ a little in the ſhape of their leaves, but in no other reſpect; and run ſo much into one another, that it is by no means eaſy to ſettle the ſynonyms of each. Even Mr. Sole, ſo ſtudious of differences in the ſpecies of *Mentha*, and ſo acute in diſcerning them, eſteems

efteems thefe to be mere varieties of each other. They have a ftrong fmell peculiar to this fpecies.

The third variety I have feen only in Bobart's Herbarium at Oxford, fent by Buddle, with a ticket in his own hand-writing as follows.

" M. candicans foliis fpicis et odore vulgari fativæ fimilis, Doody " in App. R. Syn. 341. I take this to be only a fweet-fcented " variety of the Menthaftrum fpicatum, folio longiore candicante, " J. B. 3. 221. Obferved by Mr. Rand plentifully in Kent, where " they call it the Rough Spear-mint. Of this kind I take to be the " Menthaftrum niveum Anglicum, Park. 32."

The fpecimen appears to be a variety of M. *fylveftris* with fmaller and fhorter leaves, fcarcely exceeding an inch in length. The fpikes are numerous, denfe, obtufe, downy, looking fomewhat like thofe of the true M. *rotundifolia*, but I am fatisfied it is not that fpecies. In Buddle's own herbarium, in the Britifh Mufeum, it is remarkable that the fpecimen to which this quotation of Doody is annexed, is almoft exactly like that marked Menthaftrum fpicatum folio longiore candicante, J. B. my firft variety of *fylveftris*, and ftill more clofely perhaps agrees with the fpecimen in Mr. Rofe's collection named under Mr. Hudfon's authority *longifolia* of his firft edition.

In the Bankfian herbarium is a fpecimen from Switzerland of Haller's *Mentha n.* 228, which has a very fweet bafil-like fmell. It appears to be a fmall downy variety of M. *fylveftris.* I have feen nothing fimilar to it in England.

My fourth variety is very often taken for the M. *rotundifolia*, and Mr. Sole has fo denominated it. It differs from the preceding varieties principally in the form of its leaves, which are elliptical, obtufe, and very broad. Culture makes no alteration in their fhape. In other refpects, after the examination of numerous wild and culti-

vated ſpecimens, I cannot find the ſhadow of a ſpecific character, nor even a difference in taſte, ſmell, or colour.

2. Mentha *rotundifolia.*

Round-leaved Mint.

M. ſpicis ſubhirſutis interruptis, foliis ellipticis obtuſis rugoſis crenatis ſubtùs villoſis, bracteis lanceolatis.

Mentha rotundifolia. *Linn. Sp. Pl.* 805. *Hudſ.* 251. *With.* 522. *Engl. Bot. t.* 446. *Hull.* 126.

M. criſpa. *Linn. Sp. Pl. ed.* 1. 576.

M. ſylveſtris. *Sole Menth.* 7. *t.* 3.

M. n. 226. *Hall. Hiſt. v.* 1. 99.

Menthaſtrum anglicum. *Riv. Monop. Irr. t.* 51. *f.* 2.

M. folio rugoſo rotundiore, ſpontaneum, flore ſpicato, odore gravi. *Bauh. Hiſt. v.* 3. *p.* 2. 219. *Raii Syn. ed.* 1. 79. *ed.* 2. 124. *ed.* 3. 234. *Herb. Buddle.*

Mentaſtrum. *Tabern. Kreuterb.* 729.

β. Menthaſtrum niveum Anglicum. *Lob. Ic.* 510. *Ger. em.* 684.

M. ſpicatum folio criſpo rotundiore colore partim albo, partim cinereo vel virente. *Bauh. Hiſt. v.* 3. *p.* 2. 219.

M. cinereum vel niveum Anglicum, variegatis foliis. *Hort. Eyſt. Æſt. ord.* 7. *t.* 3. *f.* 2.; too large and luxuriant.

In ruderatis humidis, et paludoſis. Fl. Auguſto, Septembri.

By the river ſide at Lydbrook near Roſs, Herefordſhire, alſo in Eſſex. *Ray.* Near Hally, Kent, plentifully. *Doody.* In Hornſey and Harefield churchyards. *Blackſtone.* Near Saltburn, Yorkſhire,

ſhire, by the ſea, in a dry ſandy place; Mr. Robſon. *With.* On the edge of an old moat at Shingham, Norfolk. *Rev. Mr. Forby.* β is common in gardens.

Caules 2—3-pedales, erecti, piloſi ſeu villoſi, pilis ſubdeflexis. *Folia* ſeſſilia, elliptico-ſubrotunda, rugoſa, ſupra ſubpiloſa, ſubtùs villoſa, acutè crenata; inferiora elliptico-oblonga; ſuperiora minora, inciſo-ſerrata. *Spicæ* paniculatæ, obtuſiuſculæ, hirſutæ, interruptæ, verticillis omnibus ferè remotiuſculis. *Bracteæ* lanceolatæ, hirſutæ, floribus duplò longiores, ſæpiùs deflexæ; inferiores ovatæ. Pili *pedicellorum* deflexi. *Calyx* parvus, campanulatus, undique hirtus, dentibus lanceolatis, longitudine tubi. *Corolla* ferè præcedentis. *Stamina* exſerta. *Odor* totius herbæ acris et ingratus.

This ſpecies is readily diſtinguiſhed by its ſmell from every variety of M. *ſylveſtris*, nor has it been obſerved to alter in that or any other reſpect, except the variegation of its leaves, which in the garden variety are ſtrikingly blotched and ſtriped with white; ſometimes they aſſume that colour entirely. It is always a much leſs hoary plant than M. *ſylveſtris*; the leaves are conſtantly more or leſs elliptical, and frequently almoſt round. The more interrupted ſpikes, broad bracteæ, ſhorter teeth of the calyx, and long projecting ſtamina, which laſt appear to be invariable, ſerve alſo to diſtinguiſh M. *rotundifolia*. Neverthеleſs it is not eaſy to give a ſpecific character which will always enable a ſtudent to know it from the former ſpecies, without adverting to its very peculiar acrid and diſagreeable ſmell; accompanied by a degree of viſcidity when touched, firſt pointed out to me by the Rev. Mr. Forby.

Mr. Sole eſteems this one of the moſt valuable Mints for medical purpoſes, and has found it very efficacious in many caſes of nervous debility.

3. MENTHA

3. Mentha *viridis.*

Spear Mint.

M. ſpicis interruptis, foliis ſeſſilibus lanceolatis acutis nudis, bracteis ſetaceis dentibuſque calycinis ſubhirſutis.

Mentha viridis. *Linn. Sp. Pl.* 804. *Hudſ.* 250. *With.* 521. *Hull.* 126. *Woodv. Med. Bot. t.* 170. *Sole Menth.* 11. *t.* 5.

M. ſpicata *α*, viridis. *Linn. Sp. Pl. ed.* 1. 576.

M. n. 229. *Hall. Hiſt. v.* 1. 100.

Mentha. *Camer. Epit.* 477.

M. Romana officinarum, ſive præſtantior anguſtifolia. *Lob. Ic.* 507. *Herb. Buddle.*

M. ſativa, *herba. Pharmac. Lond.*

β, M. anguſtifolia ſpicata. *How. Phyt.* 74. *Raii Syn. ed.* 1. 79.

M. anguſtifolia ſpicata glabra, folio rugoſiore, odore graviore. *Raii Syn. ed.* 2. 123. *ed.* 3. 233. *Herb. Sherard.*

M. ſpicata noſtras, Cardiacæ ſativæ formâ et odore æmula, folio rugoſiore. *Pluk. Mant.* 129.

Mentha. *Camer. Epit.* 477. benè.

γ, M. ſpicata anguſtifolia glabra, ſpicâ latiore. *Dill. in Raii Syn.* 233. *Dale in Herb. Sherard.*

M. ſylveſtris, longioribus, nigrioribus, et minùs incanis foliis. *Bauh. Pin.* 227. *Sherard.*

δ, M. ſpicata glabra latiore folio. *Dill. in Raii Syn.* 234. *Dale in Herb. Sherard.*

In paluſtribus. Fl. Auguſto.

Near Exmouth, Devonfhire, and on the banks of the Thames. *Hudfon.* On a common between Glaftenbury and Wells, alfo in a meadow 4 miles from Bath, and various places by the fide of the Avon between Bath and Kelfton. *Mr. Sole.* β found by Mr. Dale by the river fide at Bocking Effex. *Ray, and Herb. Sherard.* On the river Medway near Maidftone, Kent. *Plukenet.* At Babergh near Norwich. *Mr. Pitchford.* γ in a meadow at Bocking, Effex. *Dillenius, and Dale in Herb. Sherard.* δ in a meadow by Manwood bridge, on the right hand of the road from Merfey-ifland to Colchefter. *Dillenius, and Dale in Herb. Sherard.*

Caules 2—3-pedales, erecti, glabri, ramofi. *Folia* feffilia, lanceolata, acuta, ferrata, glabra, quandoque fubtùs fubhirfuta; in β, γ et δ latiora et breviora, magifque aliquantulùm rugofa. *Spicæ* paniculatæ, elongatæ, acutæ, verticillis ferè omnibus remotiufculis. *Bracteæ* fetaceæ, floribus duplò longiores, magis vel minùs ciliatæ; inferiores fubindè lanceolatæ. *Pedicelli* omninò glabri. *Calyx* fulcatus, in α glaber, in β, γ et δ dentibus ciliatis, pilis longitudine variis. *Corolla* gracilis, purpurea, glabra. *Stamina* longitudine varia.

The common Spear-mint of the gardens was not reckoned among our wild plants by either Ray or Dillenius. Mr. Hudfon however admits it, and the authority of Mr. Sole confirms his opinion. It is diftinguifhed from the other fpiked Mints by its lanceolate, pointed, and perfectly fmooth leaves. Its flower-ftalks and tube of the calyx are alfo quite fmooth, though the teeth of the latter are not always free from hairinefs; and the bracteæ are generally ciliated. This is our firft variety, the real *Mentha viridis* of the Linnæan herbarium and of all authors.

Our 2d 3d and 4th varieties have been enveloped in great obfcurity, probably

probably from Ray's having fo ftrongly infifted upon the firft of them being diftinct from the garden Spear-mint. Hence Hudfon was induced to feparate them from that, and, on account of their hairy fpikes perhaps, to refer them to his *villofa*, our *fylveftris*. I am convinced the conftant nakednefs of their flower-ftalks and bafe of the calyx, how hairy foever the teeth may be, is a decifive mark of their having no affinity to *fylveftris* or *rotundifolia*, but, on the contrary, evinces their belonging to the *viridis*, with which their general habit and ftructure altogether agree. They only differ from it in having a ftronger and lefs grateful fmell; their leaves are more rugofe, rather broader, and generally fhorter; their bracteæ perhaps are not quite fo fetaceous as in the *viridis*, but all thefe circumftances vary. With refpect to their differences from each other, nothing can be more flight; nor fhould I have believed that any botanift would have made them different fpecies, had I not examined the authentic fpecimens of Dale in Buddle's and Sherard's collections. Of thefe my variety γ has the moft hairy fpike, the teeth of the calyx and the bracteæ being fringed with long white hairs. The leaves are alfo a little hairy beneath. It is not eafy to underftand why Dillenius defines this "*fpica latiore.*" δ has fhorter and rather broader leaves, and the hairs on the bracteæ and calyx are fhorter. β, the moft common variety, has broader leaves, with a lefs hairy fpike.

I cannot conclude this account of M. *viridis* without noticing one more variety of that fpecies, though it has not yet been obferved wild in Great Britain. This differs from the foregoing chiefly in having very broad ovate leaves, deeply and fharply ferrated, more or lefs crifped or curled about the edges. The bracteæ and calyx-teeth are fringed with fhort hairs, and the former are broader than is ufual in the other varieties, fo that they might be termed linear-lanceolate. This is the——

Mentha floribus ſpicatis, foliis cordatis dentatis undulatis ſeſſilibus. *Linn. Hort. Cliff.* 306. *n.* 3. *Herb. Cliff.* but the ſynonyms there quoted belong to M. *criſpa* of Linnæus, a moſt diſtinct ſpecies.

Another ſpecimen with ſhorter and rounder leaves is in the Cliffortian herbarium marked " Mentha criſpa verticillata *C. Bauh. Pin.*" which certainly it cannot be. This ſpecimen however is not alluded to in the *Hortus Cliffortianus.*

I have in my poſſeſſion two ſpecimens of this plant from Miller's herbarium, communicated to him by Houſton, who gathered them in the Leyden garden in 1728, and has affixed to them a ticket, in his own hand-writing, containing four ſynonyms, every one of which, I verily believe, belongs to a different ſpecies, and not one of them to the plant in queſtion! With all theſe ſynonyms it is however diſtinguiſhed in Boerhaave's *Hort. Lugd. Bat.* 185, *n.* 3.* and a fifth is there ſuperadded which belongs to ſtill another ſpecies different from all the reſt. Such extreme confuſion is rare, even in the hiſtory of *Menthæ!* It happens that one of theſe ſynonyms, *M. rotundifolia rubra, Aurantii odore, Moriſ. v.* 3. 369. belongs to Mr. Sole's *M. odorata,* commonly called in our gardens Orange Mint; and the moſt curious circumſtance of all is, that Miller, in the 8th edition of his Dictionary, n. 9, meaning to deſcribe this Orange Mint by the name of *M. rubra,* and happening to have before him the two ſpecimens now in my poſſeſſion, with this erroneous ſynonym of Moriſon annexed, fabricated from them his character and deſcription; conſequently what he has ſaid by no means accords with the plant implied by his latin as well as engliſh name, and which I have no doubt was what he had in his garden.

* Theſe ſynonyms were copied by Houſton from Boerhaave's work, as appears by an error of the preſs which he has retained, in citing John Bauhin, 318 inſtead of 218.

4. MENTHA

4. Mentha *piperita.*

Pepper Mint.

M. ſpicis obtuſis infernè interruptis, foliis petiolatis ſubovatis glabriuſculis, calyce baſi glaberrimo.

α, foliis ovato-lanceolatis.

Mentha piperita. *Hudſ.* 251. *With.* 523, *var.* 2. *Woodv. Med. Bot. t.* 169.

M. piperita officinalis. *Sole Menth.* 15. *t.* 7.

M. piperitis, *herba. Pharmac. Lond.*

M. officinalis. *Hall.* 127.

M. aquatica nigricans, fervido ſapore. *Herb. Buddle.*

Eales' Pepper-mint. *Pet. H. Brit. t.* 31. *f.* 10.

β, ſpicis abbreviatis, foliis ovatis.

Mentha piperita. *Hull.* 127.

M. piperita vulgaris. *Sole Menth.* 19. *t.* 8.

M. ſpicis brevioribus et habitioribus, foliis Menthæ fuſcæ, ſapore fervido Piperis. *Raii Syn. ed.* 2. 124. *ed.* 3. 234. *t.* 10. *f.* 2.

M. fervida nigricans, breviore folio et ſpicâ. *Herb. Sherard.*

M. aquatica ſive Siſymbrium. *Bauh. Hiſt. v.* 3. *p.* 2. 223?

γ, foliis cordato-ovatis.

M. piperita ſylveſtris. *Sole Menth.* 53. *t.* 24.

M. hircina. *Hull.* 127.

In aquoſis. Fl. Auguſto, Septembri.

α in Hertfordſhire. *Dr. Eales.* In a ſwampy place on Lanſdown, near Bath, called the Wells; alſo by the ſide of the Avon in

 Newton-

Newton-mead. *Mr. Sole.* In a rivulet in Bonfall dale near Matlock, 1790. β in Effex. *Dale.* By Wandfor (Wandfworth) river. *Herb. Sherard.* In various watery places about Bath, and between Wells and Glaftenbury; alfo in Chiltern-bottom, Wilts. *Mr. Sole.* γ in a fwampy place at Lyncomb Spa, and various other wet places about Bath. *Mr. Sole.* In a little peninfula on the fouth-weft fide of Saham meer near Watton, Norfolk, obferved by Mr. Crowe and myfelf in 1797.

Caules erectiufculi, 2—3-pedales, (in γ 4-pedales,) ramofi, purpurafcentes, fubhirfuti, pilis recurvis. *Folia* omnia petiolata, ovata, acutiufcula, ferrata, atro-viridia, fupra glabriufcula, fubtùs pallidiora magifque hirfuta, venis albidis vel purpurafcentibus; in α anguftiora et ferè lanceolata; in β breviora et fubelliptica; in γ latiora, cordato-ovata, fæpiùs glabra. *Spicæ* terminales, folitariæ, obtufiufculæ, infernè interruptæ, verticillo infimo (in α et γ) remotiffimo, pedunculato; in β abbreviatæ, obtufiores, et ferè capitatæ. *Bracteæ* lanceolatæ, ciliatæ. *Pedicelli* vel omninò glabri, vel fupernè hirfuti, pilis raris recurvis. *Calyx* fulcatus, gracilis, glandulofopunctatus, bafi omninò denudatus et glaberrimus, dentibus atropurpureis, ciliatis, quandoque (in γ) apicem verfus undique hirfutus, pilis adfcendentibus. *Corolla* purpurafcens. *Stamina* inclufa. *Odor* pungens, fubcamphoratus; *fapor* aromaticus, fervidus, amaricans; in γ virofus et ingratus.

Britifh botanifts have long been in great perplexity concerning the fynonyms of the common garden pepper-mint, fo valuable for its medicinal properties. No one had however fufpected that it was not the *Mentha piperita* of Linnæus, till his herbarium arrived amongft us. His original fpecimen there preferved is indeed the pepper-mint of the north

north of Europe, well defcribed by Bergius in his Materia Medica, but quite diftinct from ours, from which it may at once be known by its very hairy flower-ftalks and calyx. It is merely a variety of the *M. hirfuta* of Linnæus with the flavour of pepper-mint, of which I fhall prefently mention another inftance; and this being the cafe, I beg leave to retain the name *piperita* for the original Pepper-mint of Ray. Of this there are two varieties, my *α* and *β*, diftinguifhed as fpecies by Mr. Sole, but by cultivating the living fpecimens with which he has favoured me, and obferving various others in a dried ftate, I am perfuaded they cannot be fpecifically diftinct. The old authors fuppofed them to be one and the fame, as we learn from the collections of Buddle and Sherard; by which alfo we afcertain with precifion the fynonyms of Ray and Dillenius. A Dr. Eales appears to have been the difcoverer of this valuable plant, and he feems to have firft gathered the long-fpiked narrow-leaved kind, fuppofed to be of the beft quality. A ticket is annexed in Sherard's herbarium to the capitate variety, which afferts that "Ray judged this to be the *M. aquatica five Sifymbrium* of John Bauhin, and compared its fcent to Penny-royal." I think the writer of this ticket miftook the plant Ray meant, which is the common *hirfuta* of Linnæus; but neverthelefs it feems very probable, from John Bauhin's figure and defcription, that our capitate pepper-mint may be what the latter intended. He fays indeed nothing about its calyx, but he defcribes and figures the *M. hirfuta* in the next chapter, exprefsly mentioning the denfe hairinefs of the calyx in that fpecies.

No writer before Mr. Sole feems to have noticed my third variety, *γ*. It is a larger plant in every refpect than the others, with broad almoft heart-fhaped leaves, and long thick fpikes. Its flavour is that of the garden pepper-mint, but much lefs agreeable. It varies in degree of hairinefs; even the upper part of the tube of the calyx is oc-

cafionally

cafionally hairy, though never the lower part; the upper fide of the leaves in general is quite fmooth and rather fhining. I have not hitherto obferved it to alter much by culture, even in a dry foil, but confidering the changes to which M. *piperita* is certainly liable, I can difcover nothing on which to found a fpecific difference between them.

5. MENTHA *odorata.*

Bergamot Mint.

M. fpicis capitatis, foliis petiolatis cordatis utrinque nudis, calyce undique glaberrimo.

Mentha odorata. *Sole Menth.* 21. *t.* 9.

M. rubra. *Mill. Dict. defcr. erroneâ.*

M. rotundifolia rubra, aurantii odore, (rotundifolia fpicata, altera C. B.) *Morif. v.* 3. 369. *fect.* 11. *t.* 6. *f.* 3, *glabra.*

In aquofis rariùs. Fl. Julio, Augufto.

Very common by the fides of rivers and brooks in Chefhire, efpecially about Afton houfe; Mrs. Walmfley: alfo in a fmall brook or ditch near Capel-Carey, between Llanrooft and Llanberrys, North Wales. *Mr. Sole.*

Herba tota glaberrima, rubicunda. *Caules* bipedales, erecti, ramofiffimi. *Folia* petiolata, latè cordata, obtufiufcula, ferrata. *Spicæ* terminales, breviffimæ, capitatæ, obtufæ, denfæ, verticillo infimo remoto, axillari, fubpedunculato. *Bracteæ* fetaceæ, omninò glabræ. *Pedicelli* teretes, glaberrimi, atro-purpurei. *Calyx* gracilis, fulcatus, glandulofo-punctatus, atro-purpureus, tubo dentibufque omninò glaberrimis. *Stamina* inclufa. *Odor* aurantiacus, ferè Monardæ didymæ.

This

This appears to me a very diſtinct ſpecies, conſtant in the broad heart-ſhaped form of its leaves, orange-like ſcent, and invariable ſmoothneſs of the whole plant, even the teeth of the calyx. In the form of that part it moſt nearly approaches to *M. piperita*. Mr. Sole conſiders it as conſtituting one ſpecies with Dillenius's Mentha Siſymbrium dicta hirſuta, glomerulis ac foliis minoribus ac rotundioribus, *Raii Syn. ed.* 3. 233. *t.* 10. *f.* 1; and Moriſon ſeems to have been of a ſimilar opinion, from the hairy figure he has annexed to his proper ſmooth one. I have not obſerved a ſpecimen of Dillenius's plant in any herbarium; but his deſcription, notwithſtanding the orange ſcent, ſeems to expreſs a variety of M. *hirſuta*, to which his figure unqueſtionably belongs; and from the place of growth it ſhould ſeem likely that Merrett's M. balſamita vel latifolia odorata might be the ſame with that; yet the epithet *latifolia* ſeems rather more proper for our plant than that of Dillenius. However this may be, I am certain *M. odorata* can never be a variety of *hirſuta*; neither is it the *aquatica* of Linnæus, though ſome part of his deſcription agrees with it. His expreſſion "planta non hirta" ſeems peculiarly expreſſive of it, but the ſtamina being conſtantly ſhorter than the corolla has always been an objection. What his *aquatica* really is will be explained hereafter.

6. Mentha *hirſuta*.

Hairy Water Mint.

M. ſpicis capitatis, foliis petiolatis ovatis, calyce undique hirſuto, pedicellis retrorſùm hiſpidis.

α, Mentha hirſuta. *Linn. Mant.* 81. *With.* 522. *Hudſ. ed.* 1. 223. *Engl. Bot. t.* 447. *Hull.* 127.

M. aquatica. *Hudf.* 252, α et β.

M. aquatica major. *Sole Menth.* 25. *t.* 11; & minor, *ibid.* 23. *t.* 10.

M. aquatica feu Sifymbrium. *How. Phyt.* 74. *Merr. Pin.* 76. *Raii Syn. ed.* 1. 78. *ed.* 2. 123. *ed.* 3. 233. *Ger. em.* 684. *Herb. Buddle.*

M. floribus capitatis, foliis ovatis ferratis petiolatis. *Linn. Hort. Cliff.* 306. *n.* 4. *Herb. Cliff.*

M. rotundifolia paluftris. *Morif. fect.* 11. *t.* 7. *f.* 6.

M. aquatica five Sifymbrium hirfutius. *Bauh. Hift. v.* 3. *p.* 2. 224. *Herb. Buddle.*

M. paluftris fpicata. *Riv. Monop. Irr. t.* 49.

Sifymbrium hirfutum. *Raii Syn. ed.* 2. 341. *ed.* 3. 233. *Herb. Buddle.*

S. hirfutum, folio anguftiore et acutiore, minimè ramofum, D. Rand. *Herb. Buddle.*

S. fylveftre. *Dalech. Hift.* 677.

Origanum vulgare. *Fl. Dan. t.* 638!

β, Mentha Sifymbrium dicta hirfuta, glomerulis ac foliis minoribus ac rotundioribus. *Dill. in Raii Syn.* 233. *t.* 10. *f.* 1.

γ, M. piperita. *Linn. Sp. Pl.* 805. *Herb. Linn. Berg. Mat. Med.* 516.

M. aquatica five Sifymbrium. *Bauh. Hift. v.* 3. *p.* 2. 223? See M. *piperita.*

δ, M. paluftris. *Sole Menth.* 13. *t.* 6.

M. aquatica. *Mill. Dict. ed.* 8. *n.* 5.

M. aquatica, folio oblongo viridi glabro, faporis fervidiffimi. *Herb. Buddle. et Herb. Bobart.*

Menthaftri

Menthaſtri aquatici genus hirſutum, ſpicâ latiore. *Raii Syn. ed.* 1. 79. *ed.* 2. 124. *ed.* 3. 234. *Bauh. Hiſt. v.* 3. *p.* 2. 222. *Herb. Buddle.*

Menthaſtrum minus ſpicatum Lobelii. *Dalech. Hiſt.* 674. *How. Phyt.* 74.

M. minus. *Ger. em.* 685.

Calamintha tertia Dioſcoridis, menthaſtrifolia aquatica hirſuta. *Lob. Ic.* 510. *Dill. in Herb. Sherard.*

ε, Mentha paludoſa. *Sole Menth.* 49. *t.* 22.

In aquoſis. Fl. Auguſto, Septembri.

α, very common in watery places.—β, in the pariſh of Eaſt Borne, Suſſex, in the road to Pevenſey. *Dill.*—γ, a native of England. *Herb. Banks.*—δ, near Bocking. *Dale.* Somerſetſhire. *Mr. Sole.* In a little peninſula on the ſouth-weſt ſide of Saham meer near Watton, Norfolk, along with M. piperita γ.—ε, in Holt-fen at Streatham, near Ely; alſo in a rivulet by the ſide of Awdry-cauſe-way, near Hadingham in the Iſle of Ely. *Mr. Sole.*

Herba tota magis vel minùs hirſuta, ſæpe purpuraſcens, odore forti, variabili. *Caules* erecti, ramoſi. *Folia* petiolata, ovata, ſerrata, ſubtùs pallidiora. *Spicæ* terminales, breves, capitatæ, obtuſæ, verticillis infimis plerumque remotiſſimis, axillaribus, pedunculatis; in δ longiores, cylindraceæ; in ε interruptæ, verticillis plurimis axillaribus, omnibus ſeſſilibus. *Bracteæ* ſæpiùs lanceolatæ, hirſutæ. *Pedicelli* undique hirſutiſſimi, pilis reflexis, albis, ſubinde arctè depreſſis. *Calyx* tubuloſus, ſulcatus, purpuraſcens, glanduloſo-punctatus, undique hirſutus, pilis ſurſùm curvatis, longitudine variis. *Corolla* purpuraſcens, extùs hirſutus. *Stamina* longitudine varia, in α et β exſerta.

 Under

Under the firſt variety of this ſpecies I comprehend every thing that has been taken in England, and indeed moſt other countries, for *M. aquatica* and *M. hirſuta* of Linnæus; the editor of *Fl. Dan. t.* 638 being not leſs ſingular in naming it *Origanum vulgare*, than he is in calling *Ballota nigra*, *t.* 673, *Mentha aquatica*. It varies greatly in luxuriance, degree of hairineſs, and colour of the ſtem and foliage; but every difference in theſe reſpects is ſo manifeſtly owing to a greater or leſs degree of moiſture, or of expoſure to light, that among all the ſynonyms I have quoted, I can find no diſtinction permanent or intelligible enough to characterize even a ſeparate variety, much leſs a ſpecies. What I have marked β is ſo diſtinguiſhed only in deference to Dillenius, and more with reſpect to the ſweet ſmell he attributes to it, than to any thing in its form. I have not been ſo fortunate as to find this variety in any old herbarium, as has been already obſerved under *M. odorata*.

γ differs but little in form from the common *M. hirſuta*, except in being rather more ſlender, of a paler hue, and the leaves ſomewhat leſs hairy. Its principal difference conſiſts in its Pepper-mint flavour. This is the *M. piperita* of Linnæus and Bergius, cultivated in the north of Europe for Pepper-mint. Linnæus's ſpecimen is from the Upſal garden, and has the flavour of our *M. piperita* very ſtrong. This circumſtance led him to conſider it as the plant of Ray and Dillenius. I have ſeen Britiſh ſpecimens exactly agreeing with it in appearance, but do not recollect to have found the ſame flavour in any wild one. If the *M. aquatica ſive Siſymbrium* of John Bauhin be not our *M. piperita* β, it is this *piperita* of Linnæus; but that point muſt remain in doubt, for want of a deſcription of the calyx. In this variety the ſtamina are ſhorter than the corolla, at leaſt in the Linnæan ſpecimen; in α and β they are longer.

δ is a very curious variety, for I cannot conſider it as a ſpecies, though

though ſtrikingly diſtinguiſhed by its infloreſcence, the *capitulum* being lengthened out into a leafleſs ſpike of ſeveral whorls, more or leſs crowded together. The lowermoſt whorl is generally axillary and pedunculated, and ſometimes is alſo elongated into a little ſpike. Buddle appears to have been the diſcoverer of this plant in England. He called it *M. aquatica, folio oblongo viridi glabro, ſaporis fervidiſſimi*; and it exiſts ſo marked in his herbarium. There is a ſpecimen of the ſame in Bobart's collection, ſent by Buddle, with a ticket of his own writing, conſiſting of the character juſt mentioned and the following remarks:

"Hæc eſt, ex ſententiâ D. Dale, Menthaſtri aquatici genus hir- "ſutum ſpicâ latiore, J. B. 3. 222. I deſire you and your lady to "taſte of this, and after ſome little time chewing, you will find it "very hot. The whole face of the plant is different from Dr. "Eale's Peppermint."

This old ſpecimen ſtill taſtes of Pepper-mint, in which, as well as every external character, it agrees with thoſe I gathered, in company with Mr. Crowe, at Saham meer. Buddle is wrong in denominating it "folio glabro," for the leaves in his own ſpecimen are by no means ſmooth on either ſide. Beneath they are paler, and conſiderably hairy. The calyx and flower-ſtalks preciſely agree with thoſe of the foregoing and following varieties. Mr. Sole's ſpecimens very nearly accord with mine, except in having only the uſual ſmell of *M. hirſuta*. I believe all the other ſynonyms above quoted are correct, though I had once great doubts concerning the figure in Lobel, Dalechamp and Gerarde, the corolla being there repreſented with a concave upper-lip. It actually aſſumes that form in ſome ſtates of the flower, both in this and other Mints; and an accurate compariſon of ſpecimens with theſe old cuts has removed my doubts. *M. paluſtris folio oblongo, Moriſ. ſect.* 11. *t.* 7. *f.* 4, in which

5 alſo

alſo the corolla is drawn galeated, may belong to this variety, or to the next; but I would not venture to quote it, not having obſerved the original ſpecimen in Bobart's herbarium.

The remaining variety ε is reckoned by Mr. Sole among the verticillate ſpecies, and indeed the living plants with which he favoured me proved truly verticillate, all the whorls being axillary, and the ſtem terminating in leaves; that is to ſay, it became exactly *M. ſativa*. A dried ſpecimen however, communicated alſo by Mr. Sole, has the upper whorls cluſtered together, with very ſmall leaves accompanying them, and the ſtem terminates in a blunt head of flowers, as in his *tab.* 22. This only ſhews how nearly the capitate Mints are allied to the verticillate; and I have another example of the ſame kind in the *M. aquatica* of the Linnæan herbarium, upon which, though I have found no exactly parallel ſpecimen wild in England, I beg here to offer a few remarks.

The original ſpecimen of *M. aquatica*, which Linnæus deſcribed, is really a verticillate Mint. The main ſtem has 10 whorls, 7 of them axillary, and the leaves that accompany theſe are much longer than the flowers. The 3 uppermoſt whorls more cloſely approach each other, and are accompanied by leaves ſo much ſmaller than the reſt, that the whole has a capitate appearance. This deſcription is applicable alſo to the 5 lateral branches of the ſame ſpecimen, and will be found to accord with the ſhort account in *Spec. Plant.* Yet Linnæus is ſcarcely correct in ſaying "planta non hirta." The upper leaves at leaſt are clothed with ſhort cloſe-preſſed hairs. The branches and calyx are alſo hairy. The flower-ſtalks are leſs ſo than is uſual in *M. hirſuta* or in *M. ſativa*, but they are furniſhed ſufficiently with little reflexed briſtles to decide the ſpecimen to belong to one or other of thoſe ſpecies; I hardly know which, for I really believe them not to be diſtinct, and that this *M. aquatica* of Linnæus,

Linnæus, and *M. paludoſa* of Mr. Sole, are the connecting links between the other varieties. In the Sherardian herbarium is a ſpecimen marked *M. paluſtris verticillata, Cat. Giſſ. p.* 168, I believe by Dillenius himſelf, with a quotation of Rivinus, *tab.* 48. *f.* 2, of the propriety of which I am very doubtful. This ſpecimen is cloſely allied to that of *M. aquatica* I have juſt been deſcribing. It is all over hairy in ſome degree, but not ſtrikingly ſo. The calyx and flower-ſtalks are exactly as in the uſual *M. hirſuta.* The whorls are 6 in number, of which the 3 or 4 uppermoſt are approximate, but the terminal one is ſmall, ſo that it could never be called a capitate ſpecimen. It is very tall, 2½ feet, with long runners from the lower part.

Hence it appears that *M. aquatica* is no longer to be conſidered as a diſtinct ſpecies. If the foregoing remarks ſhould appear long and tedious, the obſcurity of the ſubject, and the great uncertainty which all botaniſts have ſo long been in, concerning the ſpecies in queſtion, muſt form my apology.

** *Verticillatæ.*

7. MENTHA *ſativa.*

Hairy Whorled Mint.

M. floribus verticillatis, caule erecto, foliis ovatis, calyce undique hirſuto, pedicellis retrorſum hiſpidis.

α, Mentha ſativa. *Linn. Sp. Pl.* 805, (excluſis ſynonymis). *Hudſ.* 253. *Engl. Bot. t.* 448.

M. verticillata. *Linn. Syſt. Nat. ed.* 10. 1099. *Hudſ. ed.* I. 222.

M. rivalis β, γ et δ, (nec α), *Sole Menth.* 45.

M. ver-

M. verticillatæ varietas, hirſutiè foliorum diſcrepans. *Raii Syn. ed.* 3. 232. *ed.* 2. 124. 6. *Herb. Bobart.*

M. Siſymbriæ facie et odore, hirſuta et verticillata, D. Rand. *Herb. Buddle.*

Calamenthæ arvenſi verticillatæ ſimilis, ſed multò elatior. *Herb. Buddle.*

β, Mentha aquatica verticillata glabra, rotundiore folio. *Dill. in Herb. Sherard.*

γ, M. verticillata minima, odore fragrantiſſimo. *Herb. Buddle*; ſub M. aquaticâ exiguâ, *Dill. in Raii Syn.* 232.

M. auſtriaca. *Jacq. Auſtr. t.* 430?

In aquoſis et paluſtribus. Fl. Septembri.

α, about rivulets on the ſide of Shotover hill near Oxford, Mr. Tilleman Bobart. *Herb. Bobart.* On the banks of the river Lea, near Hackney. *Mr. Edward Forſter.* At Saham in Norfolk, and in many other places.—β, in a ditch on the left hand of Chalk's-green, going from Braintree to Leez houſe. *Dillenius.*—γ, found by Mr. Buddle, in company with Mr. Francis Dale ſen. by the ſide of the new river near the upper end of Stoke Newington. *Herb. Sherard.* On Skoulton common near Hingham, Norfolk, but with only the uſual ſmell of variety α.

Habitus, pubeſcentia, figura foliorum, et color variabilis, omninò Menthæ hirſutæ. Differt tantùm floribus omnibus verticillatis, axillaribus. Verticilli inferiores ſæpiùs pedunculati ſunt.

I can give no deſcription of this Mint which will not be a repeti-

tion

tion of the foregoing, except that the flowers are all whorled. With reſpect to the hairineſs, the form of the leaves, the pale green or purple colour, and in general the ſmell, there is no difference. I have parallel varieties of both in all theſe particulars, except indeed that I have never found the Pepper-mint flavour in any variety of *M. ſativa*; but I have an inſtance of the ſweet ſmell of *ſativa* var. γ in an old ſpecimen of *M. hirſuta* in my poſſeſſion. This however is of ſmall importance. In the calyx and flower-ſtalk they accord preciſely. The hairs which entirely clothe the former are curved upwards, thoſe which cover the latter are either curved backwards, or cloſely preſſed to the ſtalk in that direction. This circumſtance will be found a certain clue to diſtinguiſh all the varieties of this plant from every other whorled mint. Without attention to it there is no poſſibility of determining them. The ſtamina are either longer or ſhorter than the corolla, which is externally hairy. Sometimes the tube has hairs in its orifice.

It is as impoſſible to mark every fleeting variation in this Mint as in the common capitate *hirſuta*. β, collected by Dillenius, and preſerved in the herbarium of Sherard, is a lax broad ſmoothiſh-leaved variety, the ſix upper whorls of which have very ſmall leaves accompanying them; a circumſtance which occurs in ſome varieties of *Mr. Sole*'s *M. gracilis*, and ſhows an approach to the ſpiked mints. The calyx is duly hairy, and the flower-ſtalks clothed with reflexed hairs, though leſs thickly ſet than uſual.

γ is the Mint that was miſtaken for the *exigua* of Linnæus, whoſe hiſtory is to be found in the third volume of our Tranſactions. I had not, when that paper was written, diſcovered the importance of the pubeſcence upon the calyx and flower-ſtalk of this genus, or I ſhould not have aſſented to the poſſibility of Buddle's plant being the *gentilis:* neither did I ſufficiently attend to the old authors to which it

it is referred. I now perceive the impoſſibility of deciding whether it may or may not be the *M. aquatica exigua* of Tragus; but I think his figure, as well as that of Lobel, much more like *arvenſis*, and the figure in Fuchſius, *p.* 291, is moſt probably *gracilis*. Dillenius therefore has been too heedleſs in his ſelection of ſynonyms here as in many other inſtances. The ſpecimens he had in contemplation are in the Sherardian collection; and as his error has cauſed much trouble to following botaniſts, they merit a particular deſcription.

In the firſt place we find the *M. gracilis (M. gentilis Engl. Bot. t.* 449), with a ticket marked, in the hand of Dillenius if I miſtake not, "*M. verticillata glabra, odore Menthæ ſativæ.*"—It muſt be remembered that by *M. ſativa* he means the Linnæan *viridis*. To this Sherard has added: "*M. hortenſis quarta. Dod. Angl.* 245. *M. anguſtifolia glabra, odore Menthæ ſpicatæ, D. Dale.* In the hop-ground at Bocking plentifully."

In the ſame ſheet of paper with this is Buddle's and Francis Dale's plant, the ſmall *ſativa*, the leaves of which are not ſmooth. It is inſcribed "found by Mr. Buddle in company with Mr. Francis Dale ſen. by the ſide of the new river near the upper end of Stoke Newington."

With them, in the ſame paper, is a third ſet of 3 ſpecimens paſted on one ſheet, marked, "obſerved by Mr. Francis Dale jun. by the brook down Lordſhip-lane near Stoke Newington." This has nearly ſmooth leaves, and does not materially differ from the firſt ſpecimen in this ſheet, *gracilis*. The calyx is only rather more conſtricted.

By the remark of Dillenius in the Synopſis, "foliis glabris et anguſtioribus à priori (M. arvenſi) differt," it appears beyond a doubt the plant he intended in that article, *p.* 232. *n.* 2, was this *gracilis*, with which he confounded Buddle's ſpecimen. No one would be juſtified in ſuppoſing a man of Dillenius's character and merit could make

make ſuch a miſtake, if theſe ſpecimens did not prove it. Conſequently the article in queſtion muſt have been ſtill involved in impenetrable obſcurity without them.

I have only to add, in concluſion of this account of *M. ſativa* γ, that Mr. Crowe and myſelf obſerved upon Skoulton common, Norfolk, great plenty of a variety very cloſely agreeing with this ſweet-ſcented ſpecimen of Buddle, except in ſmell, for ours has merely the uſual ſcent of *M. ſativa*, nor has culture in dry or wet ground altered it. The figure and deſcription of Jacquin's *M. auſtriaca* come very near this. The leaves are occaſionally of a dark ſhining green, but that is accidental.

Perhaps ſome apology is neceſſary for the trivial name *ſativa*, as applied to a Mint which is never cultivated. I can only ſay the ſpecific names of *Menthæ* in general are very bad and inexpreſſive. Few perſons would prefer *verticillata*, the original denomination of this plant in Linnæus. He ſeems to have been aware of its impropriety; and the wrong ſynonyms in *Sp. Plant.* which he copied from the ſpecimen ſent him by Miller, belonging to the Mint uſually called *ſativa*, and which is really cultivated in gardens, probably led him to adopt that name. I have more eſpecially thought it not worth altering, as the ſpecies will perhaps not be kept diſtinct from *hirſuta*.

8. Mentha *acutifolia.*

Fragrant ſharp-leaved Mint.

M. floribus verticillatis, foliis ovato-lanceolatis utrinque acutis, calyce undique hirſuto, pilis pedicellorum patentibus.

Mentha verticillata. *Mill. Dict. ed.* 8. *n.* 17. *Herb. Miller.*

 M. ver-

M. verticillata aromatica, folio longiore et acutiore. *Rand. Mſs.*
M. aquatica verticillata odoris grati. *Herb. Buddle.*

Ad fluviorum margines, rariùs. Fl. . . .
Obſerved by Mr. Rand on the ſide of the river Medway, Kent; *Buddle*; between Rocheſter and Chatham. *Miller.*

Herba hirſuta, odore ſuavi. *Caulis* erectus, bipedalis, ſubſimplex, pilis arctè deflexis. *Folia* breviùs petiolata, patentia, ovato-lanceolata, utrinque acuta, inæqualiter ſerrata, baſi apiceque integerrima. *Verticilli* numeroſi, ſeſſiles, denſi, petiolis ferè æquales, multiflori. *Bracteæ* lineari-lanceolatæ, vel ſubulatæ. *Pedicelli* hiſpidi, pilis horizontaliter patentibus, longitudine variis, ſubinde recurvatis. *Calyx* tubuloſus, undique hirſutus, imprimis ad baſin, pilis adſcendentibus. *Corolla* extùs fauceque piloſa. *Stamina* incluſa.

I know this Mint only by a ſpecimen from Miller's herbarium, preſented to me by Sir Joſeph Banks, and another in Buddle's collection. It is cloſely allied to *M. ſativa*, and perhaps may be merely another variety of *hirſuta*. The leaves however are narrower, more pointed at each end, and more unequally ſerrated. The ſmell is that of Frankincenſe Thyme, as in *M. ſativa γ.* Its moſt diſtinguiſhing character conſiſts in the hairs which clothe the flower-ſtalks being either altogether horizontal, or only occaſionally recurved at their tips, whereas in *M. ſativa* and *hirſuta* they are cloſely reflexed ſo as to touch the ſtalk with their points, and ſometimes quite depreſſed. This mark, added to the ſhape of the leaves, and the whorls being altogether ſeſſile, make me venture to deſcribe this as a diſtinct ſpecies, at leaſt till ſome botaniſt has an opportunity of inveſtigating it in its native place of growth.

9. MENTHA *rubra.*

Tall Red Mint.

M. floribus verticillatis, foliis ovatis, caule erecto flexuoso, pedicellis calycibusque glaberrimis dentibus hirsutis.

Mentha sativa. *Sole Menth.* 47. *t.* 24.
M. verticillata. *Raii Syn. ed.* 3. 232. *Riv. Monop. Irr. t.* 48. *f.* 1?
M. crispa. *Hort. Eyst. Æst. ord.* 7. *t.* 5. *f.* 1.
M. crispa verticillata. *Bauh. Pin.* 227. *Moris. sect.* 11. *t.* 7. *f.* 2. *Herb. Bobart.*
M. crispa verticillata, folio rotundiore. *Raii Syn. ed.* 2. 124. *Bauh. Hist. v.* 3. *p.* 2. 215. *Herb. Buddle. et Herb. Sherard.*
M. prima. *Dod. Pempt.* 95.
M. sativa rubra. *Ger. em.* 680.
M. cruciata. *Lob. Ic.* 507.

In fossis, et ad fluviorum margines. Fl. Septembri.
By Hackney river at the ferry-house. *Herb. Sherard.* In Peckham fields. *Dill. in Raii Syn.* North Wales and Shropshire. *Mr. Sole.* By the road side between Edmonton and Enfield; also near Walthamstow. *Mr. Edward Forster.* Under a wet hedge in the road from Watton to Saham church, Norfolk, plentifully.

Herba glabriuscula odore forti congenerum. *Caulis* 4—6-pedalis, erectus, flexuosus, parùm ramosus, purpurascens, glaber. *Folia* petiolata, latè ovata, inciso-serrata, saturatè viridia, lucida; subtùs pallidiora, venis subhirsutis: superiora minora et subrotunda, interdùm crispa. *Verticilli* numerosi, pedunculati, multiflori. *Bracteæ* lineari-lanceolatæ, apice subciliatæ; interiores setaceæ.

Pedicelli

Pedicelli teretes, purpurei, lucidi, glaberrimi. *Calyx* tubulofo-campanulatus, refinofo-punctatus, glaberrimus, dentibus ciliatis, quandoque dorfo hirfutis. *Corolla* magna, purpurea, glabra, refinofo-punctata. *Stamina* longitudine varia.

This is a very diftinct fpecies of *Mentha*, often cultivated in gardens, where it is fometimes called Heart-mint, or Red-Mint, and found wild in different parts of the kingdom; yet it has never been well underftood by late writers. Linnæus appears not to have known it, for it is not in his herbarium, and he confounds its fynonyms with his *M. fativa*. Whether Hudfon comprehended this fpecies under his *rubra*, I know no means of determining. It appears clearly to be what Ray and Dillenius intended in the places above quoted, both from what they have faid upon the fubject, and the fpecimens in all the old herbariums. Thofe in the collection of Sherard have a number of quotations of the old authors in his hand-writing. Some other hand has added the fynonym of Rivinus, *Mentha verticillata*. Probably this may have been done by Dillenius, for he has firft inferted the Mint by that name in the *Synopfis*; but I very much doubt its propriety. A loofe ticket, in the hand of Samuel Dale I believe, has the fynonym of C. Bauhin, and "I have found this in three feveral places." On another loofe ticket is written with a pencil, in a hand I am unacquainted with, "Odor Menthæ hortenfis. Hackney river at the ferry houfe. Sept. init." Hence we learn that the conjecture of Mr. Edward Forfter, of the *M. fativa* of Linnæus being the mint Dillenius had from the Hackney river, fee *Engl. Bot.* 448, however probable, is not exactly true. Dillenius indeed as well as Ray confounded *M. fativa* with the mint of the Hackney river; but I fufpect they did fo from the report of Bobart and his brother, without comparing fpecimens. My reafons for this

this conjecture are as follows. There is not to be found in the collections of Buddle or Sherard any specimen of *M. sativa* with marks of its having been gathered by Tilleman Bobart at Shotover, or with any indication of its being the supposed hairy variety of the *M. verticillata* of the Synopsis. We learn those particulars only from Bobart's herbarium. In that collection is a paper of the tall Red Mint, my *rubra*, marked with several of the synonyms I have adopted. With this is one loose specimen of *M. sativa*, and a note in Buddle's writing, saying, "I want your brother Tilleman's variety of this, *hirsutie foliorum discrepans*." Hence I conclude *M. sativa* to be that supposed variety, of which perhaps James Bobart had no duplicate to send Buddle, and he might put his note to the specimen as a memorandum to procure him the plant at some future opportunity, which seems never to have happened, as it is not in Buddle's herbarium at present.

It is certainly very wonderful that any botanist could confound *M. sativa* with the plant now under consideration, even without attending to the calyx and flower-stalks, which in the *rubra* are always perfectly smooth, except a few hairs on the margin, rarely on the back, of the teeth of the calyx. The smooth reddish zigzag stem, with a very few short branches curved in various directions, rising to the height of 5 or 6 feet when supported by bushes; the deep-green shining nearly smooth leaves; the large handsome purple flowers; readily distinguish the *M. rubra* from all others, nor is it liable to the variations to which most species are subject.

10. MENTHA *gentilis*.

Buſhy Red Mint.

M. floribus verticillatis, foliis ovatis, caule ramoſiſſimo patulo, calycibus baſi, pedicelliſque, glabris.

Mentha gentilis. *Linn. Sp. Pl.* 805.
M. rubra. *Sole Menth.* 41. *t.* 18.

β, M. rivalis *α*. *Sole Menth.* 45. *t.* 20.

γ, M. variegata. *Sole Menth.* 43. *t.* 19.
M. arvenſis verticillata verſicolor. *Moriſ. ſect.* 11. *t.* 7. *f.* 5. *Herb. Buddle.*
M. criſpa verticillata. *Herb. Cliffort.*

In aquoſis et ruderatis rariùs. Fl. Auguſto.
α, in pools and brooks between Mole and Llanrooſt, North Wales. *Mr. Sole.* *β*, in Lock's-brook between Weſton and Twerton, Somerſetſhire. *Mr. Sole.* *γ* about towns, but ſcarcely to be met with truly wild.

Herba ſubhirſuta. *Caulis* erectus, pedalis (in *β* tripedalis), ſcaber, ramoſiſſimus, ramis elongatis, patentibus. *Folia* petiolata, ovata, obtuſiuſcula, ſerrata, lætè viridia, utrinque pilis ſparſis brevibus ſubhirſuta, venis ſubtùs albidis, omnia ferè conformia; in *β* longiora et ſubelliptica; in *γ* variegata. *Verticilli* ſubſeſſiles, multiflori; in *γ* interdum longiùs pedunculati. *Bracteæ* lanceolatæ, magnitudine variæ. *Pedicelli* teretes, purpurei, ſæpiùs glaberrimi; in *γ* ſubinde parùm hirſuti, pilis deflexis. *Calyx* tubuloſo-campanulatus, ſupernè hirſutus, pilis adſcendentibus; baſi glaber; un-

 dique

dique reſinoſo-punctatus. *Corolla* pallidè purpuraſcens. *Stamina* incluſa.

Mr. Sole's ſpecimen of his *M. rubra* moſt preciſely agrees with the original Linnæan ſpecimen of *gentilis*, and it is on his authority I reckon this among the Britiſh Mints. His *rivalis* α appears to me the ſame in every eſſential point, differing only in having a taller ſtem, and the lower leaves more elliptical. His figure indeed bears more reſemblance to ſome of the ſuppoſed varieties of this ſpecies, which I have already referred to *ſativa*, more eſpecially in the hairineſs of the calyx. We muſt not however pay too much attention to that circumſtance in any of Mr. Sole's plates, his artiſts (however excellent) not having had it in view. Nor is it fair to charge any body concerned with neglect on that account, the moſt acute botaniſts having never conſidered the pubeſcence of the calyx or flower-ſtalk as of any material importance in this genus.

The variegated Mint, ſo common in gardens and about cottages, agrees with the Linnæan *gentilis* in every particular, and not with *arvenſis*, to which Bobart referred it in Moriſon's work. In one part of Buddle's herbarium it is marked *Calamintha ocymoides* of Tabernæmontanus; and indeed his figure is not unlike it. In the Cliffortian herbarium it is erroneouſly named *M. criſpa verticillata.* I find by a ſpecimen from Bobart in Buddle's collection, and another in his own at Oxford, that he at one time ſuppoſed this variegated Mint to be *M. arvenſis verticillata, folio rotundiore, odore aromatico*, of Vernon. *Raii Syn. ed.* 2. 123. But as he has omitted this ſynonym in Moriſon's work, he probably altered his opinion; and indeed I have a ſpecimen of a different plant which appears more likely to be that of Vernon, as will be mentioned under *M. arvenſis.*

 This

This variegated variety is liable to have all its whorls elevated on footſtalks above half an inch long, in which caſe the bracteæ are more numerous as well as larger. In a very dry gravelly garden I have obſerved, among a thouſand ſpecimens, ſome few more downy in every part than the reſt, and in theſe only the calyx and flower-ſtalks alſo were hairy. But this is a very rare alteration in Mints, nor do I know another inſtance of it. The direction of theſe hairs was almoſt as in *M. ſativa*; whereas in *arvenſis* they are ſtrictly horizontal: a diſtinction that will always be found very important.

11. MENTHA *gracilis.*

Narrow-leaved Mint.

M. floribus verticillatis, foliis lanceolatis ſubſeſſilibus, caule ramoſiſſimo erecto, calycibus baſi pedicelliſque glaberrimis.

α, Mentha gracilis. *Sole Menth.* 37. *t.* 16.
M. gentilis. *Engl. Bot. t.* 449. *With.* 524.
M. rubra. *Hudſ.* 252.
M. fuſca ſive vulgaris. *Raii Syn. ed.* 1. 78. *ed.* 2. 123. *ed.* 3. 232. *Herb. Buddle.*
M. verticillata glabra, odore M. ſativæ (viridis). *Herb. Sherard.*
M. anguſtifolia glabra, odore M. ſpicatæ. *Dale in Herb. Sherard.*
Balſamita officinarum. *Hort. Eyſt. Æſt. ord.* 7. *t.* 3. *f.* 3.

β, Mentha pratenſis. *Sole Menth.* 39. *t.* 17.

γ, M. gentilis. *Sole Menth.* 35. *t.* 15.
M. hortenſis verticillata, Ocymi odore. *Moriſ. ſect.* 11. *t.* 7. *f.* 1. *Herb. Buddle.*

M. car-

M. cardiaca. *Ger. em.* 680, ex icone.

M. verticillata minor, acuta, non crifpa, odore Ocymi. *Bauh. Hift. v.* 3. *p.* 2. 216, ex defcr.

In aquofis, pratifve humidis. Fl. Augufto.

α, at Bocking and Stoke-Newington. *Herb. Sherard.* Near Walthamftow. *Mr. B. M. Forfter.* Near Bradford, Wilts. *Mr. Sole.* At Saham, Norfolk. β, in the New Foreft, Hants. *Mr. Sole.* γ, frequent in ditches and wafte places near towns and villages, but fcarcely wild. *Mr. Sole.*

Herba fubhirfuta. *Caulis* erectus, fefquipedalis, fcaber, rubicundus, medio præcipuè ramofiffimus. *Folia* fubfeffilia, uniformia, lanceolata, acuta, ferrata, bafi anguftata, lætè viridia, utrinque pilis brevibus fubhirfuta; in β deflexa. *Verticilli* multiflori, fæpiùs feffiles, interdum pedunculati. *Bracteæ* lanceolatæ, hirfutæ. *Pedicelli* teretes, purpurei, omninò glaberrimi. *Calyx* tubulofo-campanulatus, purpureus, refinofo-punctatus; bafi glaberrimus; apice dentibufque hirfutus, pilis albis, erectis. *Corolla* purpurea, apice barbata. *Stamina* inclufa.

When the defcription in *Engl. Bot. p.* 449 was written, I fuppofed this Mint not to be fpecifically diftinct from *M. gentilis* of Linnæus. To this I was led by the exact agreement of their calyxes and flower-ftalks, except indeed that the latter, as well as all the lower part of the calyx, are more conftantly and completely fmooth and polifhed in *M. gracilis* than in the preceding. Mature confideration has now induced me to feparate them, and it is never too late to correct an error. *M. gracilis* has lanceolate, fharp-pointed, fharply ferrated and almoft feffile leaves, more upright branches, and the

 fmell

ſmell of *M. viridis*, at leaſt in the moſt common variety, *α.*—*β* has the flavour of *M. piperita*, and is beſides remarkable for its deflexed leaves. The very near reſemblance in ſenſible qualities of theſe two varieties to the two ſpecies juſt named, led me at one time to ſuſpect the infloreſcence had here again deceived us, and that they were only varieties of thoſe ſpiked Mints. A careful examination of tha important part, the calyx, however, guarded me againſt this error, at leaſt as far as *M. piperita* is concerned. The calyx of that ſpecies is much longer, leſs campanulate, and more acutely ribbed than in any variety of *M. gracilis*; in ſhort its form and appearance, without adverting to other parts of the plant, ſufficiently prove them to be diſtinct. In *M. viridis* I am obliged to confeſs the calyx moſt preciſely accords in every particular with that of *gracilis*. But the leaves of the latter being attenuated at the baſe, and by no means ſo ſtrongly veined, or rugoſe, as in the *viridis*, even without conſidering the infloreſcence, prevent us from confounding them. I ſpeak now of *gracilis α*; for in *β* and *γ* the leaves are much leſs attenuated at the baſe, and more approach to an ovate form. *γ* is the mint Caſpar and John Bauhin characterized by its ſmell, which they juſtly compared to *Ocymum* or Sweet Baſil. This is not perceptible in all ſtages of its growth, but very permanent in dried ſpecimens, in which it reſembles the flavour of Muſcadel Grapes. In this plant the leaves that accompany the flowers are ſo very much ſmaller than the reſt, and often ſo like bracteæ, they almoſt reduce it to the ſpiked diviſion of the genus. It is indeed a moſt puzzling plant. Perhaps it ought to be reckoned a ſpecies, and arranged next to *M. viridis*. This is a point I muſt leave to thoſe who can ſtudy it in a truly wild ſtate. In garden ſpecimens I find the floral leaves vary too much in ſize to enable me to come to any poſitive determination.

12. MENTHA

12. MENTHA *arvensis.*

Corn Mint.

M. floribus verticillatis, foliis ovatis, caule ramosissimo, calycibus campanulatis undique hirsutis pilis patentibus.

Mentha arvensis. *Linn. Sp. Pl.* 806. *Hudf.* 253. *With.* 524. *Hull.* 128. *Relh.* 224. *Sibth.* 182. *Abbot.* 127. *Sole Menth.* 29. *t.* 12. *Fl. Dan. t.* 512.

M. floribus verticillatis, foliis ovatis acutis serratis. *Linn. Hort. Cliff.* 307. *n.* 5. *Herb. Cliff.*

M. verticillata hortensis odore Ocymi C. B. Pin. *Herb. Cliff.* nec Bauhini.

M. aquatica. *Raii Syn. ed.* 1. 78.

M. seu Calamintha aquatica. *Raii Syn. ed.* 2. 123. *ed.* 3. 232. *Herb. Buddle.*

M. arvensis verticillata procumbens. *Moris. sect.* 11. *t.* 7. *f.* 5.

Calamintha aquatica. *Ger. em.* 684. *How. Phyt.* 18. *Merr. Pin.* 18.

β, Mentha arvensis major, verticillis et floribus amplis, foliis latioribus, staminibus corollâ longioribus, odore grato. *Sole Menth.* 29, γ.

γ, M. præcox. *Sole Menth.* 31. *t.* 13.

δ, M. gentilis. *Mill. Dict. ed.* 8. *n.* 15. *Herb. Mill.*

M. verticillata, rotundiore folio, odore Ocymi. *S. Dale. Mss.*

M. verticillata glabra, foliis ex rotunditate acuminatis, Buddle. *Herb. Buddle & Herb. Bobart.*

M. arvensis verticillata, folio rotundiore, odore aromatico. *Raii Syn. ed.* 2. 123? *ed.* 3. 232?

ε, M. agrestis. *Sole Menth.* 33. *t.* 14.

In arvis inundatis, præcipuè arenofis. Fl. Junio, Julio.

γ, in moift meadows. *Mr. Sole.* δ, on the right hand of the road from Bocking to Gofsfield, Effex. *Mr. Dale.* At Shelford, Cambridgefhire; Mr. Wigmores. *Ray?* ε, common in corn-fields and neglected gardens about Mendip hills, Shepton-Mallet and Frome, Somerfetfhire. *Mr. Sole.*

Herba magìs vel minùs pilofa, odore forti, fæpiùs peculiari et ingrato. *Caulis* ramofiffimus, plerumque diffufus; in γ et ε erectus. *Folia* petiolata, ovata, feu elliptico-ovata, obtufiufcula, variè ferrata; in ε rugofa, et ferè cordata. *Verticilli* multiflori, fubfeffiles. *Bracteæ* lanceolatæ, fubtùs hirfutæ. *Pedicelli* teretes, apice purpurafcentes, fæpe glaberrimi, interdum plus minus hirfuti, pilis fparfis, fubreflexis. *Calyx* brevis, campanulatus, obfoletiùs fulcatus, refinofo-punctatus, undique pilofus, pilis horizontaliter patentibus. *Corolla* dilutè purpurea, extùs pilofa. *Stamina* in α et β exferta, in γ, δ et ε inclufa.

The common *M. arvenfis* is one of the few Mints that every botanift calls by the fame name. It is met with in the borders, or between the furrows, of corn-fields, efpecially in places where water has ftagnated in the winter. Its pale-green downy furface, branched diffufe ftem, and efpecially a peculiar ftrong odour which comes from every part of the herb when touched, and which moft people compare to that of blue mouldy cheefe, readily diftinguifh it. To which may be added the campanulate fhort figure of its calyx, and the long hairs which entirely clothe that part projecting horizontally. If this circumftance be attended to, it can never be confounded with any of the preceding. The flower-ftalk is round, polifhed, purple in the upper part, often quite fmooth, but for the

moft

moſt part clothed with a few ſcattered hairs, rather pointing downwards, moſt numerous about the upper half of the ſtalk. The ſpecimen in the Cliffortian herbarium, referring to n. 5 of *Hort. Cliff.* has the flower-ſtalks more hairy than uſual. Another in the ſame collection, which I have cited above, has them nearly ſmooth.

My 2d variety β, Mr. Sole's third, differs very little indeed from the common one, except in being rather larger, from its ſituation in wet meadows. The ſtamina in both are for the moſt part longer than the corolla. Mr. Sole's 2d variety I have not ſeen. He deſcribes it with a reddiſh upright ſtem, narrow leaves, and a pleaſant ſmell.

γ flowers earlier than the common kind, and has a more ſhining ſurface, though clothed with ſhort hairs. The leaves alſo are more recurved and elliptical. In ſmell I can find no difference, nor can I diſcover any thing on which to found a ſpecific diſtinction. The ſtamina being ſhorter than the corolla cannot be thought ſufficient.

δ I know only by the original ſpecimen in my poſſeſſion, gathered by Dale, and deſcribed by Miller as *gentilis.* I have never ſeen it living. The ſpecimen in Buddle's herbarium differs only in having the baſe of the calyx perfectly ſmooth, whereas in mine that part is all over hairy. The leaves are ſhorter and broader than in common *arvenſis*, but no other difference is diſcernible. The ſcent of Baſil, which Dale attributes to it, can only mark it as a variety.—I think there is the greateſt probability of this being Mr. Vernon's aromatic mint mentioned in Ray's *Synopſis* ; but having ſeen no original ſpecimens, I quote it with heſitation. In Buddle's herbarium is a ſpecimen of *M. ſativa* γ, with rounder and ſhorter leaves than uſual, found in 1710 by the Thames' ſide near the Neat-houſes, Chelſea, by himſelf in company with Mr. Rand, which he ſays they agreed to be Vernon's plant. Hence it appears that plant was even

then

then only to be determined by gueſs, and Dillenius has merely copied it into his edition of the *Synopſis* without any additional remark. Bobart, as I have already mentioned, once took the variegated *gentilis* of the gardens to be the Mint of Vernon. I know not that this uncertainty can ever be removed, except ſome old herbarium ſhould unexpectedly afford an original ſpecimen.

ε is a very remarkable plant, for which I am obliged to Mr. Sole, the only perſon I believe who has found it; and I have been much inclined to make it, as he does, a diſtinct ſpecies. Its leaves are very broad and almoſt heart-ſhaped, marked with ſtrong parallel veins which render them rugoſe. The ſtamina are ſhorter than the corolla. In every other particular, even in ſmell, it agrees perfectly with *M. arvenſis*, eſpecially in the calyx and flower-ſtalk; and I think it muſt be conſidered as a variety, for I have abundant proofs that the ſhape of the leaves is more liable to vary in this ſpecies than even moſt others.

13. Mentha *Pulegium.*

Penny-Royal.

M. floribus verticillatis, foliis ovatis, caule proſtrato, pedicellis calycibuſque undique tomentoſis: dentibus ciliatis.

Mentha Pulegium. *Linn. Sp. Pl.* 807. *Hudſ.* 254. *With.* 525. *Hull.* 130. *Relh.* 224. *Sibth.* 182. *Woodv. Med. Bot. t.* 171. *Sole Menth.* 51. *t.* 23.

Pulegium. *Raii Syn. ed.* 1. 79. *ed.* 2. 125. *ed.* 3. 235. *How. Phyt.* 99. *Merr. Pin.* 99. *Bauh. Hiſt. v.* 3. *p.* 2. 256. *Fuchſ. Hiſt.* 198. *Riv. Monop. Irr. t.* 23. *f.* 1.

P. regium. *Ger. em.* 671.

Pulegium, *herba, flos. Pharmac. Lond.*

In

In ericetis et paſcuis humidis. Fl. Septembri.

Herba odore acri, aromatico. *Caules* proſtrati, ramoſiſſimi, repentes, piloſi, angulis obtuſiuſculis. *Folia* parva, petiolata, ovata, obtuſa, crenato-ſerrata, ſubtùs præcipuè ſubhirſuta. *Verticilli* ſeſſiles, pro foliorum ratione magni, numeroſi, multiflori. *Bracteæ* nullæ. *Pedicelli* tomentoſo-incani, ſeu pilis breviſſimis, denſiſſimis, undique tecti.—*Calyx* tubuloſus, gracilis, ſulcatus, reſinoſo-punctatus, pilis denſis, brevibus, porrectis, undique veſtitus, dentibus ciliatis, acutis, inæqualibus, fauce villis albis conniventibus clauſâ. *Corolla* calyce duplò longior, purpurea, baſi alba, extùs villoſiſſima. *Stamina* exſerta.

Penny-royal cannot be confounded with any other Britiſh Mint, nor is it ſubject to any varieties worth notice. Culture makes it more luxuriant and erect. Sometimes the flower is white. There are ſome foreign ſpecies carefully to be diſtinguiſhed from it by the different hairineſs of the calyx, as well as other marks. They agree with it in the ſhort ſoft cloſe downineſs of its flower-ſtalks, by which, without regarding its ſmall leaves, and different habit, it is decidedly diſtinguiſhed from every other Britiſh ſpecies. This difference confirms the remark I have ſo often made, of the importance of thoſe parts in characterizing the ſpecies throughout the whole genus.

XX. *On two Genera of Plants belonging to the Natural Family of the Aurantia. By Joseph Corréa de Serra, LL.D. F.R.S. & L.S.*

Read July 2d, 1799.

THE object of this paper is to examine the generic characters and the natural affinities of the *Crateva Marmelos* of Linnè, and of the *Crateva Balangas* of Kœnig; two plants, each of which I conceive to be a genus by itself, not only distinct from the *Crateva*, but also belonging to a different natural order.

Among the many advantages deriving to botany from the progress made of late in the knowledge of the natural affinities of plants, one of the most obvious is the facility it affords in many instances, of recalling to their natural places, plants which, by oversights unavoidable in artificial systems, even the most ingenious, had been associated to extraneous genera. Of this advantage the examination of the two plants above mentioned will, I presume, afford an example.

The affinity of the genus *Crateva* (such as it was first constituted by Plumier *, and adopted by Linnè †,) to all the genera of the *Capparides*, is obvious to every inquirer of natural affinities. However different the principles might have been on which natural arrangements of plants have been attempted, this association has been al-

* Under the name of Tapia. *Plum. Nova. Plant. Gen. p.* 22. *t.* 21.

† In the first edition of *Gen. Pl. p.* 113.

 ways

ways acknowledged as ſtrictly natural. To the ſagacity and profound ſcience of Juſſieu we are of late indebted for the conſtant and almoſt excluſive characters which diſtinguiſh this family, and circumſcribe its affinities. He remarked, that the ſeeds in this natural order contain a crooked embryo without periſperm; that their placentation is always parietal, in a fruit which in conſequence muſt be moſtly unilocular *.

The *Crateva marmelos* of Linnè, and the *Crateva balangas* of Kœnig, I have obſerved in the herbarium of the Right Hon. Sir Joſeph Banks, and I have received the fruits of both from him. Upon examining the fruits I have found that their ſeeds contain a ſtraight embryo with a ſmall radicula, and fleſhy, large, plano-convex cotyledons; and that their placentation is central, in a multilocular fruit: they cannot therefore be ſpecies of *Crateva*. The further examination of the other parts of their fructification confirms this firſt opinion, and, ſhewing how far they differ from the *Crateva* in other important points, gives us a clue to find their proper place in the natural ſyſtem.

But before I proceed to the deſcription of the fructification of theſe two plants, as I intend to deviate in ſome manner from the common method of deſcribing, I muſt give the reaſons which perſuade me of the utility and perhaps neceſſity of the alterations I adopt, and ſhow that ſingularity, or ſpirit of innovation, are not my motives, but that the preſent ſtate of ſcience requires, in ſome manner, this change of method.

Of the ſix diviſions in the Linnæan method of deſcribing genera, four relate to the flower, and exiſt at the ſame period, viz. the calyx, coroll, ſtamina, and piſtill; the other two exiſt after the decay of the preceding, viz. the pericarp and the ſeed. They are the off-

* *Juſſieu Gen. Pl. p.* 246.

 ſpring

fpring of the flower rather than a part of it; and their ftructure at the period when they are the objects of obfervation and defcription, has often received material alterations from their ftate when in the flower. Linnè confidered them in this light, when he defcribed the germen, that is to fay, the fruit as it exifts in the flower, as a part of the piftill; and again defcribed it in the articles of pericarp and feed, to fhow its ftructure as it exifts, long after the decay of the flower, when ripe and perfect.

Former botanifts having given great attention to the calyx and coroll, and the fexual fyftem being founded on a minute confideration of the ftamina and piftill, thefe four parts are accurately and carefully exhibited in the Linnæan defcriptions of genera, but this is not the cafe with refpect to the fruits or the feeds. We are at prefent enabled, by the obfervations of Juffieu, Gærtner, and a few other botanifts, to defcribe thefe important objects with an accuracy unknown to former ages, and to collect from the detail of their parts a number of characters, (many of them of great weight,) which, multiplying the points of comparifon, eftablifh more firmly the degrees of affinity or difference betwixt plants, and thereby lead us to a more intimate knowledge of their nature. Even in the defcription of the flower, the progrefs made by botany fince the death of Linnè requires perhaps fome change: 1ft, Becaufe the infertion of the ftamina, a character of a fuperior order, was by him carefully marked only in the Icofandria, Polyandria, and Gynandria, in which claffes it is (if I may be allowed the term) the claffific character. 2dly, Becaufe in proportion as that multitude of different organs which go by the general and in many inftances unmeaning name of *nectarium*, are phyfiologically difcriminated, and accurately defined, the neceffity of marking them for what they are in nature, is more and more fenfibly felt. And 3dly, becaufe the *germen* itfelf, as a part of the flower, varies

varies very often, in number of loculaments and of feeds, from the ripe fruit.—The comparifon of thefe two ftates, of the fame object, requires an attention, from thofe who feek the ways of nature, far greater than has been hitherto beftowed on it.

Thefe reafons, I hope, will be a fufficient excufe in the eyes of every candid Botanift, for my attempting to defcribe the fructification of the plants which are the fubject of this paper, in twelve, inftead of fix divifions, in the following manner:

1. The *flower*, in the four ufual Linnæan divifions of *calyx*, *coroll*, *ftamina*, and *piftill*; marking, however, the infertion of the ftamina, and the nature of what Linnè, in analogous plants, has called nectarium.

2. The *fruit*, in four divifions, viz. the parts of the flower which perfift and accompany the fruit, and which I defign by the name of *induviæ*, the *pericarp*, the *placentation* of the feeds, and the *dehifcentia*.

3. The *feed*, in four divifions, viz. its *form*, its *integuments*, the *perifperm*, and the *embryo*.

The two genera which we are now to confider are deficient in fome of thefe parts; but it is equally interefting to the Botanift to know the abfence of fuch parts, as to be acquainted with their form when prefent. What new terms I am obliged to employ fhall be explained in the notes.

The

The following is the fructification of the *Crateva marmelos* of Linnè, to which, conceiving it to be a new genus, I give the name of

ÆGLE*.

* FLOS.

CAL. *Perianthium* monophyllum parvum quinquelobum fructum non comitans †.

COR. *Petala* quinque calyce multotiès majora, patentia ovato-acuta.

STAM. *Filamenta* plurima brevia ſubulata in receptaculi elevati, ſeu diſci hypogyni parte externa inſerta; *Antheræ* oblongæ erectæ.

PIST. *Germen* ovatum ſuperum. *Stylus* brevis craſſus. *Stigma ovale* (ſulcis plurimis obſoletè ſulcatum juxta Kœnig).

** FRUCTUS.

INDUVIÆ nullæ.

PERIC. *Bacca* corticoſa turbinato-globoſa, cortice glabro ſcrobiculato per maturitatem lignoſo. *Loculamenta* (in meo ſpecimine) decem cincta carne ſpongioſa, poſt maturitatem evanida.

PLACENT. *Chorda piſtillaris* ‡ compoſita centralis; chordulæ par-

* One of the Heſperides.

† The calyx remains after the flowers decay, but falls before the maturity of the fruit; as I have ſeen in the ſpecimens which I have obſerved.

‡ In every fruit, properly ſo called, there is a longitudinal bundle of fibres and veſſels which may be traced from the inſertion of the fruit in the receptacle to the ſtigma: to this bundle the ſeeds are affixed, from it they originated, and through it they are moſt probably fecundated. This important bundle I call *chorda piſtillaris.*

tiales

tiales tot quot loculamenta axi ſuberoſo coalitæ. Semina in unoquoque loculamento plurima ſimplici ſerie diſpoſita, funiculo umbilicali recto brevi chordulis affixa.

DEHISC. nulla.

*** SEMEN LIBERUM.

FORMA. Semen ſubovatum compreſſum, versùs umbilicum anguſtatum, piloſum.

INTEG. duplex; exterius coriaceum pilis intertextis glutinoſis veſtitum; interius membranaceum ad alterum latus funiculo adnato ſtipatum in obtuſiori parte chalaza lata ferruginea notatum.

PERISP. nullum.

EMBR. ſemini conformis luteſcens, cotyledones duo plano-convexæ carnoſæ, radicula minima.

This deſcription is made from ſpecimens ſent from India by Dr. Roxburgh, Dr. Ruſſel, Dr. Kœnig, and by the Moravian miſſionaries of Tranquebar.

Two ſeemingly diſtinct ſpecies of this genus exiſt in the herbarium of Sir Joſeph Banks, both arboreous, and both growing in the Eaſt Indies. To that which has been known under the name of *Crateva marmelos*, I continue the old trivial name, and call it *Ægle marmelos.*

The

The *Crateva balangas* of Kœnig, known to the Engliſh in the Eaſt Indies by the name of Elephant apple, has the following fructification ; and, as a new genus, I give it the name of

FERONIA*.

* FLOS.

CAL. *Perianthium* monophyllum quinquepartitum planum parvum (deciduum ex Kœnig.)

COR. *Petala* quinque oblonga acuta patentia calyce multotiès longiora.

STAM. *Filamenta* decem, baſi lata compreſſa, utrinque ad baſin villoſiſſima, erecta, in receptaculo elevato ſeu diſco hypogyno inſerta. *Antheræ* obovatæ erectæ.

PIST. *Germen* ſubovatum ſuperum. *Stylus* brevis conicus. *Stigma* acutiuſculum.

** FRUCTUS.

INDUVIÆ nullæ.

PERIC. *Bacca* corticoſa turbinato-ovata, cortice aſpero per maturitatem lignoſo. *Loculamenta* plura, carne fungoſa obvoluta.

PLACENT. *Chorda piſtillaris* compoſita centralis ; chordulæ partiales, tot quot loculamenta, in baſi et apice pericarpii tantùm unita, cæterùm plus minuſve per maturitatem ? divergentia. Semina in unoquoque loculamento plura, ſimplici ſerie diſpoſita funiculo umbilicali lato chordulis affixa.

DEHISC. nulla.

* One of the Deities to whom the Ancients dedicated Foreſts.

*** SEMEN.

*** SEMEN LIBERUM.

FORMA. Semen ovatum lenticulari compreſſum piloſum.

INTEG. duplex; exterius membranaceum pilis intertextis veſtitum, interius coriaceum, in obtuſiori parte chalaza lata ferruginea notatum.

PERISP. nullum.

EMBR. Semini conformis albeſcens, cotyledones duæ plano-convexæ carnoſæ, radicula minima.

This genus I have deſcribed from ſpecimens ſent from India by Dr. Ruſſel and Dr. Kœnig. We are acquainted with only one ſpecies, a tree growing in the foreſts of India, which I call *Feronia elephantum*, from the name by which it goes among the Engliſh inhabitants of the Eaſt Indies.

Plants are always better deſcribed from freſh, than from dried ſpecimens; but in order to ſatisfy myſelf, and to be able to anſwer for the characters, I have ſcrupulouſly avoided giving any which were not diſcernible in the ſpecimens before me *, though Kœnig's deſcriptions of the *Crateva marmelos* and *Balangas*, are more explicit

* For inſtance, the hilum I have not marked, in either of the two genera, becauſe I could not ſufficiently diſtinguiſh its figure. That of the *Feronia* ſeems to me worthy the attention of the botaniſts who may have occaſion to obſerve it in a freſh ſpecimen. The fleſh, which in both genera ſurrounds the loculaments, I deſcribe ſuch as it was in the dry ſpecimens after having been ſoaked. The membranes, which form the loculaments, I have not deſcribed, though eſſential parts, becauſe I conceive they muſt be very different in the freſh fruit, from what they appeared to me in the dry ſpecimens. I muſt notice, however, that their interior ſurface, in both genera, is covered with large round ſcars of dried veſicular glands, of which I will hereafter take an opportunity of ſpeaking more at large, and in a more proper place, in a Memoir on the Natural Order of the *Aurantia*.

in what reſpects the flower, having the advantage of being made from living ſubjects.

The ſeeds, the fruits, the inſertion of the ſtamina on a *diſcus hypogynus*, ſurrounded by a *calyx monophyllus*, and a coroll of a defined number of petals, ſhow to a demonſtration that theſe two genera belong to the family of the *Aurantia*. What place they are to occupy among their affinities, and conſequently what are their true eſſential and differential characters, will be diſcuſſed in a future paper on this natural order.

XXI. *Descriptions of the Mus Bursarius and Tubularia Magnifica; from Drawings communicated by Major-General Thomas Davies, F.R.S. & L.S. By George Shaw, M.D. F.R.S. V.P.L.S.*

Read June 4, 1799.

THE *Mus bursarius* belongs to a particular division in the genus, containing such species as are furnished with cheek-pouches for the temporary reception of their food. It seems not to have been yet described, or at least not so distinctly as to be easily ascertained. It approaches however to one or two species mentioned by Dr. Pallas, Mr. Pennant, and others; but differs in size, being much larger, as well as in the appearance of the fore-feet, which have claws differently formed from any of the pouched species hitherto described.

In order to secure its knowledge among Naturalists, it may be proper to form for it a specific character, viz.

Mus *cinereus, caudâ tereti brevi subnudâ, genis saccatis, unguibus palmarum maximis fossoriis.*

Ash-coloured rat, with short round nearly naked tail, pouched cheeks, and the claws of the fore-feet very large, formed for burrowing in the ground.

The cheek-pouches are far larger in proportion to the animal than in any other of this tribe, and therefore have given occasion for the specific name.

This

This quadruped was taken by fome Indian hunters in the upper parts of Interior Canada, and fent down to Quebec. It is now in the poffeffion of Governor Prefcot.

TAB. VIII. exhibits the *Mus burfarius* of its natural fize.

THE *Tubularia magnifica* muft be confidered as by far the largeft fpecies of its genus yet difcovered. It is found in various parts of the coaft of Jamaica, adhering to the rocks. It is very fhy, and on being approached inftantly recedes within its elaftic tube, which on a farther alarm alfo retires into the rock, and fpecimens can be obtained only by breaking off fuch parts of the ftone as contain them. Thefe, being put into tubs of fea-water, may be kept for months in perfect order; and from one of them fo preferved this drawing was made.

The fpecific character may be thus given:

TUBULARIA *tubo fimplici albido, tentaculis numerofiffimis albo rubroque variatis.*

Tubularia with a fimple whitifh tube, and very numerous tentacula variegated with red and white.

It is neceffary to obferve, that, in the form of its body, at leaft as far as can be judged from the part reprefented in the back view of the animal, it feems to make an approach to the genus *Amphitrite*, and may be confidered as in fome degree connecting thefe two genera.

It may perhaps be doubted whether fome of the fmaller figures, fuppofed to be the young animals, may not in reality belong to fome fpecies of *Actinia.*

TAB.

J. Davies, delin. 1799.

Mus bursarius.

T. Davies. delin.t 1799

Tubularia magnifica.

Tab. IX. *Fig.* 1. ſhews the back of the *Tubularia magnifica*, when expanded, of its natural ſize.

2. The front.
3. The animal expanding from the tube.
4. The ſame retreating when diſturbed.
5. Entirely withdrawn into the tube.
6. Suppoſed young ones of the ſame ſpecies.

XXII. *Ac-*

XXII. *Account of the Fluſtra Arenoſa, and ſome other Marine Productions.* *By Henry Boys, Eſq. F. L. S.*

Read June 4, 1799.

FLUSTRA *arenoſa.*

Fl. cruſtacea arenoſa lutoſa, poris ſimplicibus ſubquincuncialibus. *Ellis Zooph. p.* 17. *n.* 10. *Gmelin Syſt. Nat. v.* i. 3829. *Pallas El. Zooph. p.* 37. *n.* 5. *Ellis Corall. p.* 74. *t.* 25. *f.* c. *Raii Syn. p.* 31.

English Sea Mat.

Tab. X.

IT may not be improper to tranſcribe Mr. Ellis's account of this production.

" This ſea mat is formed of ſand and ſlime into a cruſtaceous body, with ſmall mouths placed almoſt in a quincunx order."

" This was ſent me from Holyhead in Wales. Its form, when intire, was exactly like the upper ſemicircular part of a colt's hoof. The ſurface of each of the cells was a little hollow in the middle, with a ſmall hole in each. From the appearance it made when I received it intire, I judged it to be what Imperatus calls his *Lorica marina.*—There is a layer of ſand and ſlime under as well as over

 the

Flustra arenosa

…en: Boys delineavit. 1797.

the cells which compofe it.—It is very friable when dry. Whether it belongs to this genus or not, I fubmit to the curious." *Ellis Zooph. p.* 17.

Great numbers of thefe bodies are found, in the fpring, on the fandy fhore between the mouth of Sandwich Haven and Deal, at low water; in fome years more than in others; particularly in May 1797.—It is undoubtedly the nidus of fome marine animal, as I have found the cells intire, with eggs in each.

In the fummer feafon there is frequently found on the fame fhore, clufters of black roundifh bodies united together by fhort cords, forming very exactly the refemblance of bunches of black grapes both as to fize and colour. The fubftance is tough and elaftic, and the bodies confift of feveral coats, the outermoft of which is black, and the innermoft perfectly tranfparent; and they are filled with clear water, containing the eggs, and fometimes the living embryos of the *Sepia officinalis.*

During the fame feafon we likewife meet with large maffes of a jelly-like fubftance, to which are connected a number of tuberculated appendages bearing together the refemblance of a mop; which tubercles are diaphanous, and include fometimes the eggs and fometimes the embryos alive of another fpecies of *Sepia*—I think the *Loligo*, but am not certain.

XXIII. *An*

XXIII. *An Account of a remarkable Variety of the Beech, Fagus Sylvatica.* *By Christian Henry Persoon, M.A. F.M.L.S.*

Read October 1, 1799.

TREES in general are not liable to thoſe alterations in their ſubſtantial parts that we obſerve in ſmaller plants. In ſome indeed the leaves frequently become by culture variegated with white or yellow ſpots, and in that ſtate are much admired by lovers of gardening. The Beech however is ſubject to vary, not only in the colour, but alſo in the figure of its leaves.

The beautiful variety of this tree with blood-red leaves* is pretty well known, and is multiplied by engrafting on the common kind; but being deficient in vigour, as all ſuch varieties originate in weakneſs, it does not always ſucceed.

A ſingular variety with deeply indented leaves has been diſcovered in Bohemia by Mr. Vignet †, not much unlike the laciniated variety of *Betula alnus* in figure.

A leſs ſtriking but uſeful variety is deſcribed by Mr. Kerner, under the name of *Mandelbúche*, Almond Beech, growing wild in

* Fagus ſylvatica, var. foliis atropurpureis. *V. Burgſdorf Anleitung zur ſichern Erziehung der Holzarten. Th. 2. p. 91.* The author mentions his being alſo in poſſeſſion of a variety of the ſame tree with ſtreaked leaves.

† F. ſylvatica, var. laciniata, foliis ovato-lanceolatis acuminatis glabris profundè ſerratis: ſerraturis acutis patentibus. *A. v. Vignet Anzeige einer neu-entdeckten Buchenabart.* Vide *Schmidts Sammlung phyſicaliſch-œconomiſcher Aufſätze, 1 band. p. 173. t. 1.*

the

Schwenterley at Natur. del.

the Duchy of Wirtemberg, and which is remarkable for its extraordinarily large leaves and fruit *.

The ſtriking variety, of which I now beg leave to preſent a ſhort deſcription and figure to the Linnæan Society, deſerves above all others the attention of Naturaliſts. It is ſo remarkable that, if it were of frequent occurrence, it might ſeem to claim the diſtinction of a peculiar ſpecies of *Fagus*. I ſhall however conſider it only as a variety, with the following characters:

FAGUS *ſylvatica*; varietas quercoides, cortice teſſellato-ſulcato.

Not far from the village of Reinhauſſen, within about two hours ride of Göttingen, is to be ſeen a ſingle individual of this variety. The people of the country call it *Rammel-buſche*, apparently from an opinion of its having originated from the intermixture of an Oak with a Beech.

The bark of the trunk and larger branches is entirely formed like that of an Oak, by which it is at once known from other Beeches. The tree has likewiſe the crooked, and proportionably ſhort, branches of the Oak; ſo that a ſpectator at ſome diſtance, or in the winter ſeaſon, would undoubtedly take it for ſuch.

It is from 40 to 45 feet high, and eight in circumference. The trunk ſtraight and upright, moſt branching at the top. As it is hollow within, and may probably not laſt many years, having already ſome dry boughs in the upper part, it is a pity ſome attempt has not been made to increaſe it, and to ſee if culture makes any change in its nature.

TAB. XI. repreſents a piece of the bark, with a leaf, of the *Fagus ſylvatica*, var. *quercoides*.

* *J. S. Kerner's Beſchreibung und Abbildung der Bäume und Geſträuche welche in dem Herzogthum Wirtemberg wild wachſen. Stuttgart* 1793. *p.* 31.

XXIV. *Catalogue of some of the more rare Plants observed in a Tour through the Western Counties of England, made in June 1799, by Dawson Turner, Esq. F.L.S. and Mr. James Sowerby, F.L.S.*

Read October 1, 1799.

THE expedition which it is in general neceſſary to employ in paſſing through a large extent of country, the want of proper books and other conveniences to examine what is found, and, above all, the ignorance of the ſpots moſt likely to prove advantageous to his reſearches, are obſtacles which every traveller, whoſe purſuit is Natural Hiſtory, muſt encounter, in a greater or ſmaller proportion. Of theſe a very conſiderable ſhare fell to our lot, the objects that we endeavoured to follow being far more numerous and extenſive than our limited leiſure would allow us to attain; for it cannot be imagined that the time left for Botany could be conſiderable, when it is known that in little more than a month we journeyed nearly a thouſand miles, ſtriving at the ſame time to beſtow attention upon the other branches of natural hiſtory, the manufactures, and the numerous antiquities with which the county of Cornwall eminently abounds.

This, then, muſt plead our excuſe (if indeed an excuſe be neceſſary) for the ſhortneſs of the following liſt, into which we have admitted no plant that we ourſelves did not ſee growing, and from which we have tried to exclude all thoſe that may not be claſſed

classed among the more rare productions of this kingdom; unless, perhaps, in the genera of *Lichen* and *Fucus*, which we considered as tribes so little known in general, that we thought we might be excused if we noticed all excepting the most common. The peculiar season of the year of course prevented our meeting with either *Musci*, *Jungermanniæ*, or *Fungi*.

We have mentioned many habitats that were before quoted by authors, but have been induced to do so from a desire to shew that the plants still exist in the same places; and we now submit the fruits of our researches to the Linnean Society, flattering ourselves with the hope that they may hereafter prove useful to some Botanist, whom chance or inclination may lead to the spots which we visited.

Having premised this, it only remains for us to express the sense we feel of the kind attention we received from the cultivators of Natural History in the places through which we passed, particularly to Richard Bryer, Esq. of Weymouth, to the Rev. J. T. Thomson, and William Penneck, Esq. of Penzance, to Thomas Webb Dyer, and William Clayfield, Esqrs. of Bristol, and to Dr. Williams of Oxford; to all of whom we are happy to own ourselves indebted, as well for repeated instances of civility, as for the trouble they took in pointing out to us the plants growing round their several towns.

Serapias latifolia—St. Vincent's Rock, near Bristol.

Valeriana rubra—Walls of Glastonbury-Abbey, and Oxford. Sometimes with a white flower.

Iris fœtidissima—Hedges about Weymouth.

Eriophorum vaginatum—Marsh near Penzance.

Carex digitata—St. Vincent's Rock.

Rubia peregrina—Hedges near Exeter, Plymouth, Sidmouth, Dunſter, &c. &c.
Anchuſa ſempervirens—near Liſkeard and Barnſtaple.
Symphytum patens—Meadows between Lyme-Regis and Sidmouth.
Campanula hederacea—near Falmouth, Penzance, Camelford, &c.
——— *hybrida*—Cornfields near the ſite of Old Sarum.
Verbaſcum Lychnitis—near Taunton.
Viola lactea—Heaths between Liſkeard and Leſtwithiel.
Illecebrum verticillatum—Boggy ground near Penzance.
Herniaria glabra—Hedges at the Lizard Point.
Beta maritima—Cliffs at Weymouth, Falmouth, &c.
Daucus maritimus, With.—Rocks about Caſtle-Treryn.
Crithmum maritimum—common in Cornwall.
Heracleum Sphondylium β—Hedges near Holſworthy, Devonſhire.
Liguſticum cornubienſe—near Bodmin.
Oenanthe crocata—plentiful in Cornwall.
Pimpinella dioica—St. Vincent's Rock.
Tamarix gallica—St. Michael's Mount.
Linum uſitatiſſimum—Cliffs at Falmouth.
Scilla autumnalis—Clifton near Briſtol.
——— *verna*—Paſtures near the Lizard-Point and Land's-End.
Aſparagus officinalis—near the Ferry and extremity of Portland Iſland.
Vaccinium Myrtillus—Hedges about Liſkeard.
Erica vagans—abundant on the Downs between Helſton and the Lizard.
Chryſoſplenium oppoſitifolium—common in Cornwall.
Dianthus cæſius—Chedder Rocks—plentiful, but moſtly in inacceſſible places.
Silene amœna, Hudſ.—Sea-coaſt at Weymouth, and in Cornwall.

Sedum sexangulare—Ruins of Old Sarum.

—— *anglicum*—common near the Sea in Cornwall and Devonshire.

—— *dasyphyllum*—Walls near Bristol.

—— *rupestre*—Chedder and St. Vincent's Rocks.

Euphorbia Paralias }—Portland-Island; we found the latter only
——— *portlandica* } near the remains of Bow-and-Arrow Castle.

Cratægus Aria—Chedder and St. Vincent's Rocks.

Aquilegia vulgaris—Hedges near Redruth.

Galeobdolon luteum—Wood between Bridport and Lyme-Regis.

Leonurus Cardiaca—Waste ground near Bristol.

Melittis grandiflora, Engl. Bot.—near Ashburton and Liskeard.

Bartsia viscosa—Marshes about Penzance.

Sibthorpia europæa—Damp hedges and boggy ground near Lestwithiel, Falmouth, Penzance, Camelford, &c.

Crambe maritima—Sidmouth Cliffs, in inaccessible places.

Lepidium petræum—St. Vincent's Rock.

——— *didymum*—Rubbish at Penryn.

Thlaspi arvense—Cornfields about Aylesbury.

Cochlearia danica—Sea coast at Portland-Island, and in Cornwall.

——— *anglica*—Marshes near Bristol.

Arabis stricta—St. Vincent's Rock.

Turritis hirsuta—Ruins of Old Sarum.

Brassica oleracea—King's-Cove near Marazion.

Geranium sanguineum—near the Lizard-Point, and Bristol.

——— *columbinum*—Hedges near Liskeard, Taunton, Wells and Bristol.

——— *maritimum*—about the Lizard-Point and St Michael's Mount.

——— *lucidum*—near Wells.

——— *rotundifolium*—Hedges near Plymouth and Bristol.

Fumaria

Fumaria capreolata }
——— *claviculata* } —Walls and Hedges round Dunſter.

Lathyrus Aphaca }
———- *ſylveſtris* } —Cliffs near Sidmouth.

Vicia ſylvatica—Cliff at Ilfracombe.

—— *lutea* *—Glaſtonbury Tor Hill.

Hippocrepis comoſa—near Dorcheſter and Briſtol.

Trifolium maritimum }
Lotus diffuſus } —Marſhes below Cooke's Folly near Briſtol.

Hypericum Androſæmum—Hedges near Saltaſh.

Tragopogon porrifolium—Marſhes below Cooke's Folly near Briſtol.

Carduus eriophorus—Hedges near Wells.

Senecio ſqualidus—Walls near the Botanic Garden, Oxford.

Lycopodium Selago—a moiſt hill between Sidmouth and Exeter.

Oſmunda regalis—common in Cornwall.

Aſplenium Ceterach—Walls about Wells and Briſtol.

———- *marinum*—Rocks at the Lizard, Caſtle Treryn, &c.

Polypodium fragile—St. Vincent's Rock.

Fontinalis minor—Rivulet near Chedder Cliffs.

Bryum criſpum—common on trees in Cornwall.

Hypnum criſpum—Wood near Wells—in fruit on St. Vincent's Rock.

Lichen Jolithus—Stones at Maiden Caſtle near Dorcheſter.

——- *calcareus*—Limeſtone Rocks, Cornwall.

——- *pilularis*—Stone-Henge.

——- *geographicus*—Rocks at Tintagel, and the Valley of Stones near Linton, Devonſhire.

——- *rupicola*—Rocks near the Lizard.

* We gathered this in great plenty, but ſaw no appearance of *V. hybrida*. See *Engl. Bot.* 482.

Lichen

Lichen coccineus *—Stone-Henge.

—— *crenularius*—Rocks, near the Lizard.

—— *tartareus*—Rocks near Redruth and the Land's End.

—— *byssinus*—Wall at Bristol.

—— *obscurus*—Rocks about Penzance, the Lizard, &c—Stone-Henge.

—— *luridus*—Chedder Rocks.

—— *cartilagineus*—St. Vincent's and Chedder Rocks.

—— *muralis*—small stones on Salisbury Plain.

—— *centrifugus*—Rocks near Redruth.

—— *omphalodes*—near Penzance, Redruth, &c.

—— *globiferus*—Stones near Castle Karn Brè.

—— *fragilis*—Stones, St. Cleere near Liskeard.

—— *paschalis*—between Lestwithiel and St. Austle.

—— *exilis*—Rocks at St. Cleere's near Liskeard.

—— *articulatus*—Trees near Liskeard.

—— *vulpinus*—Rocks and Trees about Castle Treryn, Liskeard, &c.

—— *plicatus*—Trees near Bodmin.

—— *fuciformis*—Rocks near King Arthur's Castle at Tintagel.

—— *Endocarpon*—Chedder and St. Vincent's Rocks.

—— *pulmonarius*—Trees about Camelford, Launceston, &c. We did not find it in fruit.

—— *scopulorum*—Rocks at the Land's End.

—— *glomuliferus*—Trees near Launceston.

—— *caperatus*—abundantly in fruit on rocks near Penzance, and in a Wood near Camelford.

* From a careful examination of this *Lichen*, which I here found in great abundance, I was persuaded of its specific difference from the *L. hæmatomma* figured in *Engl. Bot.*—They hardly resemble each other in any circumstance except the colour of the shields. *D. T.*

Lichen

Lichen scrobiculatus } —Trees near Bodmin and Liskeard.
——— *plumbeus* }
——— *miniatus*—Chedder, St. Vincent's and Tintagel Rocks.
——— *saccatus*—Chedder and St. Vincent's Rocks.
——— *perlatus*—We found this in fruit only in a wood between Camelford and Bodmin, and on a stone-fence near Ilfracombe.
——— *fuliginosus*—plentiful upon trees and rocks about Launceston, Bodmin, &c.
——— *Tremella*—Rocks in Devonshire.
Fucus tamariscifolius—Falmouth and St. Michael's Rock.
——— *fibrosus*—Falmouth and Ilfracombe.
——— *fœniculaceus*—Weymouth, Lyme-Regis and Falmouth.
——— *kaliformis*—abundant on the Western Coast.
——— *esculentus*—King's Cove (Cornwall) and St. Michael's Mount.
——— *sanguineus*—Portland Island.
——— *alatus*—Weymouth.
——— *hypoglossum*—Mount Edgecumbe.
——— *loreus*—Falmouth and Mount's Bay.
——— *bulbosus*—St. Michael's Mount.
——— *canaliculatus* } —common on the Western Coast.
——— *pygmæus* }
——— *jubatus*—King's Cove and Ilfracombe.
——— *pinnatifidus* var. *osmunda*—Weymouth.
——— *tomentosus* } —King's Cove and Mount's Bay.
——— *tuberculatus* }
——— *aculeatus*—Portland Island and Kynance Cove near the Lizard.
——— *ovalis*—Portland Island, Falmouth and Mount's Bay.
——— *pinastroides*—Weymouth and Portland Island.
——— *subfuscus*—Portland Island. We saw only one specimen.

Fucus

Fucus corneus—King's Cove.

—— *cartilagineus*
—— *obtusus* } Weymouth.

Ulva purpurascens
—— *rubens* } Mount Edgecumbe and Falmouth.

Conferva gelatinosa—near Launceston.

Sphæria licheniformis—Stones on Glastonbury Tor Hill.

—— *nitida*—in a Wood between Camelford and Bodmin.

Lycoperdon equinum—near Maiden Castle near Dorchester, on a ram's horn.

XXV. *A new Arrangement of the Genus Narciſſus. By A. H. Haworth, Eſq. F.L.S.*

Read October 1, 1799.

THE genus *Narciſſus* is at once beautiful, fragrant, and (as a vernal one,) intereſting; but although it has been univerſally cultivated for more than a century, both in this country and on the Continent, it is ſtill comparatively but little underſtood; and yet the ſpecies are neither numerous nor deficient in characteriſtic diſtinctions.

I truſt, therefore, the following account of its component ſpecies, ſo far only as I grow them myſelf, will not be unacceptable to the Linnean Society. It has nothing to recommend it, but the novelty and ſimplicity of its diviſions, and characters eſtabliſhed by a ten years cultivation.

I poſſeſs ſeveral *Narciſſi* which I have not inſerted in this arrangement, not having had them long enough to diſcover characters ſufficiently permanent.

Nearly all the *Narciſſi* have bulbous roots of the tunicated kind, which are ſaid to grow ſpontaneouſly in the ſouthern parts of Europe, but more eſpecially in Spain. In England we have four. For brevity's ſake I ſhall give but one ſynonym to each deſcribed ſpecies, and that ſhall be the beſt: thoſe which are new ſhall be marked with an aſteriſk.

SYNOPSIS

SYNOPSIS SPECIERUM.

NARCISSUS.

* *Petalis nectarium æquantibus.*

† *Foliis filiformibus.*

tenuifolius. 1. N. nectario lobulato. *Park. Par.* 107. *f.* 7.
I firſt met with this ſpecies and the next in the Botanic Garden of J. Symmons, Eſq. Paddington.

* *inflatus.* 2. N. nectario apice ſubcontracto integro, ſtylo exſerto.

Bulbocodium. 3. N. nectario turgido integerrimo, ſtylo incluſo. *Curt. Bot. Mag.* 88.

†† *Foliis planis.*

minor. 4. N. nectario apice patulo. *Curt. Bot. Mag.* 6.

* *albus.* 5. N. nectario recto apice ſublobato.
I met with this in the Botanic Garden, Brompton, about three years ſince.

Pſeudo-narciſſus. 6. N. nectario apice criſpo crenulato. *Engl. Bot.* 17. a moſt excellent figure.

* *Sibthorpii.* 7. N. nectario ore patulo, tubo corollæ abbreviato.
I was informed I think by the late Mr. Curtis, from whom I had this plant, that the late Dr. Sibthorp found it wild in Oxfordſhire ſeveral years ſince; and it is probably the N. *Pſeudo-narciſſus* of the *Fl. Ox.*

bicolor. 8. N. nectario luteo, petalis albescentibus.

N. bicolor *Linn. Sp. Pl.* 415. excluso synonimo *Bauh. Pin.* 52, et forte *Rud. elys.* 2. *p.* 71. *f.* 9. quæ non vidi.

major. 9. N. nectario amplissimo apice patentissimo inciso undulato. *Curt. Bot. Mag.* 51.

** *Petalis nectario duplò majoribus.*

† *Floribus nutantibus.*

incomparabilis. 10. N. uniflorus, nectario plicato. *Curt. Bot. Mag.* 121.

* *elatior.* 11. N. subquadriflorus, nectario 6-lobulato.

odorus. 12. N. subtriflorus, nectario apice crispo. *Curt. Bot. Mag.* 78.

orientalis. 13. N. subbiflorus, nectario inciso. *Ait. Kew.* 1, 409.

This species might probably arrange better in the last section.

†† *Floribus cernuis.*

triandrus. 14. N. stylo staminibusque inclusis. *Curt. Bot. Mag.* 48.

*** *Petalis nectario triplò majoribus.*

† *Pauciflori.*

poeticus. 15. N. uniflorus, nectario rotato membranaceo crenato, petalis foliisque amplissimis. *Engl. Bot.* 275, excellent.

angusti-

anguſtifolius. 16. N. uniflorus, nectario breviſſimo crenulato, petalis foliiſque gracilibus. *Curt. Bot. Mag.* 193, excellent.

A very diſtinct ſpecies.

biflorus. 17. N. ſcapo ante floreſcentiam geniculato. *Curt. Bot. Mag.* 197, excellent.

tenuior. 18. N. ſubbiflorus, foliis lineari-ſubulatis. *Curt. Bot. Mag.* 379.

I have known this plant ſeveral years in the Brompton Botanic Garden, when it was cultivated under the name of *uniflorus.* I firſt propoſed the name *tenuior* to Mr. Curtis, obſerving at the ſame time that the difficulty of diſtinguiſhing it from *N. biflorus* was effectually removed by that term.

†† *Multiflori.*

Tazetta. 19. N. nectario apice contracto integerrimo. *Park. Par.* 81. 3.

crenulatus. 20. N. nectario apice patente crenulato. *Park. Par.* 81. 5.

* *tereticaulis.* 21. N. nectario apice patente, lobulato.

* *compreſſus.* 22. N. nectario expanſo crenato, foliis latis anguſtiſque, caule valde compreſſo, angulis obtuſiſſimis.

Jonquilla. 23. N. foliis ſemiteretibus. *Curt. Bot. Mag.* 15.

XXVI. *Some*

XXVI. *Some Obſervations upon Inſects that prey upon Timber, with a ſhort Hiſtory of the Cerambyx violaceus of Linnæus.*

By the Rev. William Kirby, F. L. S.

Read November 5th, 1799.

NO part of the economy of this terreſtrial globe is more worthy of admiration, or furniſhes a wider field for inquiry, than the methods by which all that vaſt variety of ſubſtances, animal and vegetable, which are produced from the earth, are kept within their proper bounds, and, when life is departed from them, are reduced to duſt; ſo that a due harmony of parts is preſerved, the relative proportion of individuals accurately adjuſted to the wants and general good of the ſyſtem; and thoſe ſubſtances which have a tendency to deform or injure it, are in due time removed out of the way, and made to contribute under another form to its ſupport.

Not to mention man, and the various ſpecies of quadrupeds, birds, fiſhes, reptiles and worms, which prey on animal and vegetable life; inſects, although very diminutive, are very powerful inſtruments, in the hands of the great Diſpoſer of events, to promote, ſometimes indeed by partial evil, the good of the whole. To them it is given in charge not only to prey on living ſubſtances, but alſo to haſten the diſſolution and decompoſition of thoſe that are dying or dead. Of theſe none ſeem to have a more arduous taſk aſſigned them, than thoſe whoſe office it is to bring on, or

accelerate the decay of the giant inhabitants of the foreſt. Numerous ſpecies of inſects, and in various ways, labour in this department (*a*). Some attack living trees, others thoſe that are dead. Some depoſit their eggs in them, that, when hatched, their larva may feed upon the wood; while others ſeek only a place well ſheltered from wet, cold, birds or other inſects, for the habitation of of their young. Again, ſome prey upon the ſoundeſt timber; while others make no attempt upon it till it begins to decay:—but all contribute, in one way or other, to the ſame end; one taking up the office, where another reſigns it; till that which from its bulk and ſolidity appeared calculated to laſt as long as the earth that gave it birth, by the ſucceſſive efforts of various kinds of inſects, is reduced in no very long time to its original duſt. So powerful are the effects produced by inſtruments which we too often overlook or deſpiſe.

To particularize ſome of the ſpecies employed in this work, and to point out what trees they attack either for food, or to ſecure a ſheltered ſituation for their offspring, may not be unentertaining, or altogether uſeleſs. I ſhall therefore mention a few of the individuals of each of the Linnæan claſſes, omitting *Hemiptera* and *Neuroptera*, of which I recollect no ſpecies that feed or nidificate in wood; reſerving the *Coleöptera*, which claſs ſends forth the moſt numerous bands of theſe minute pioneers of nature, to the laſt; and concluding the whole with a ſhort hiſtory of the *Cerambyx violaceus* of Linnæus.

Among the *Lepidopterous* inſects, the larva of the *Phalæna Bombyx*

(*a*) Inſects are not the only labourers employed in this field; the ſame end is promoted by the *Algæ* and *Fungi*. Witneſs the numerous tribe of *Lichens*, *Tremellæ*, *Agarici*, *Boleti*, *Auriculariæ*, *Sphæriæ*, &c. which derive their nouriſhment from decaying wood, and aſſiſt in its decompoſition.

Coſſus

Coſſus is known to attain its great ſize by feeding upon the willow, and other kinds of wood when in a decaying ſtate. The ſame tree affords nouriſhment, as we learn from Mr. Lewin *(a)*, to the *Sphinx crabroniformis*; as does the poplar to the *Sphinx apiformis (b)*, and *veſpiformis.* The inſects of the *Hymenoptera* claſs bring on the decay of ligneous ſubſtances in various ways. The neſts and cells of many of the genuine *Veſpæ* are made of a kind of paper formed of the filaments of wood. I have often been highly amuſed by ſeeing the common waſp, which, though a miſchievous, is at the ſame time a very ingenious animal, employed in ſcraping gate-poſts with her ſtrong maxillæ, to collect materials for this purpoſe; a ſight which Reaumur informs us it was long before he could enjoy *(c)*. The *Hornet* frequently perforates hollow trunks, to build her paper metropolis in a ſheltered ſituation *(d)*. The *Leaf-cutter* bees, of which there are ſeveral ſpecies all confounded under the common name of *A. centuncularis*, in order to place their *centunculi (e)* of curious conſtruction, in perfect ſecurity, make their way into the body of various trees. One ſpecies ſelects the willow for this purpoſe *(f)*, another the oak *(g)*, or the elm indifferently. *Apis*

(a) Linn. Tranſ. Vol. iii. p. 2. *(b)* Ibid. p. 1.

(c) Reaum. Tom. vi. Mem. vi. p. 180, 181.

(d) Ibid. Mem. vii. p. 217. I am informed by my friend Sir Thomas Cullum, whoſe ſpirit and accuracy of obſervation throw light upon every branch of Natural Hiſtory, that in the year 1785, in Mr. Porte's gardens at Ham near Dovedale, the hornets deſtroyed a great number of the young oaks by making their way into their heart, and there building their neſts.

(e) Ibid. Mem. iv. Tab. 9. fig. 8—181. Tab. 10. Reaumur's ſpecies makes its neſt under ground; but Geoffroy's (*Hiſt. ab. des Inſ.* Tom. ii. p. 410. n. 5.) and our Engliſh ones make theirs in the trunks of trees.

(f) Raii Hiſt. Inſ. p. 245. Sir E. King, in *Philoſ. Tranſ.* abridged by Lowthorp, Vol. ii. p. 773. Willoughby in Do. p. 773, 774. Dr. Martin Liſter in Do. 774.

(g) Apis centuncularis, Donovan Brit. Inſ. Vol. iv. Tab. 120.

maxilloſa

maxilloſa (a) nidificates in poſts and rails. *Apis violacea*, as we learn from Reaumur *(b)*, conſtructs curious cells for its young, of ſeveral ſtories, in the ſupports of eſpalier trees. *Apis furcata (c)* makes ſimilar cells in decaying wood. Many other inſects of this claſs, particularly *Spheges*, and illegitimate *Veſpæ*, emerge from cylindrical holes in trees and poſts, in which they were nouriſhed in their larva ſtate.

Of *Dipterous* inſects, the *Tipula pectinicornis*, ſingular for the branching antennæ of the male, and many other ſpecies of that genus, in their larva ſtate, inhabit putreſcent wood *(d)*: and a numerous army of the *Oniſcus Aſellus*, to name no other inſect in the *Aptera* claſs, is generally to be met with in thoſe parts of decaying trees under the bark, which are deſerted by other inſects; upon which, from its ſaw-duſt-like excrement, it appears to feed.

Having gone over the other claſſes, it remains that we mention the devourers of wood amongſt the *Coleoptera*. Foremoſt in the ranks comes the gigantic *Lucanus Cervus*, whoſe larva feeds upon the decaying wood of the oak *(e)* and the elm. In the latter is alſo found the *Lucanus inermis (f)*. The aſh affords nouriſhment both to *Lucanus parallelipipedus* and *L. cylindricus*. *(Scarabæus cylindricus* of Linn. but ſurely a true *Lucanus.)* The ſeveral ſpecies of the genus *Ips (Boſtrichus* Fab.) feed upon timber between the bark

(*a*) Marſham in *Linn. Tranſ.* Vol. iii. p. 27, 28.

(*b*) *Reaumur*, Tom. vi. Mem. ii. Tab. 5.

(*c*) *Furcata.* A. cinereo pubeſcens; atra; antennarum articulo primo, fronte, labioque flavis: abdomine apice furcato; tarſis ferrugineis. *Panzer. Fn. Inſ. Germ. Init.* No. lvi. Tab. 8. *Obſ.* Panzer's inſect is the male of this ſpecies.

(*d*) Habitat in carie arborum ſolitaria larva, pupaque. *Schrank. Enum. Inſ. Auſtr.* p. 423. n. 853. I have found the pupa in the ſame ſituation.

(*e*) In Europæ ligno quercino putrido. *Linn. Syſt. Nat.*

(*f*) Inermis. 2 L. ſcutellatus, convexus, brunneus, maxillis brevibus dente laterali elevato. Marſham M. S.

 and

and the wood, upon the ſurface of which they uſually trace in feeding, what Linnæus calls pinnated labyrinths, in which a number of lateral lines, nearly parallel with each other, form right angles on each ſide, with a central one; and thus the bark is finally ſeparated from the wood. Moſt trees, I imagine, have a particular ſpecies of this genus aſſigned to them. Thus *Ips piniperdus* attacks the fir. *Ips Scolytus*, the elm. *Ips niger (a)*, *I. griſeus (b)*, *I. rufeſcens (c)*, and, I believe, *I. nebuloſus (d)*, undertake the barking of the aſh. *Ips fuſcus (e)*, and probably more ſpecies, feed upon the oak. Even ſhrubs do not eſcape, for whin or furze *(Ulex europæus)* is preyed upon by the minute *Ips rhododactylus (f)*, which I have frequently taken coming out of the larger ſticks of a dead whin-fence in my own garden. Next to theſe come the *Ptini*; ſeveral ſpecies of which are found in wood. I meet with *Ptinus teſſellatus* in the willow, and I believe it will attack deal or any ſoft wood. It is one of thoſe inſects that is called the death-watch, from a certain ſound which it makes at regular intervals reſembling the clicking of a watch, which, the vulgar ſuperſtitiouſly imagine, forebodes the death of ſome perſon in the houſe in which it is heard. The *Ptinus pectinicornis* alſo, and *Pt. cylindricus (g)*, feed in the ſame tree.

(a) Niger. 24. I. ſubcylindricus, niger, thorace punctulato, elytris crenato-ſtriatis, plantis piceis. Marſham M.S.

(b) Griſeus. 9. I. ferrugineus, capite nigro, ſupra ferrugineo teſtaceoque varius. Ibid.

(c) Rufeſcens. 10. I. ſubtùs luteus, ſuprà rufus, elytris luteo nebuloſis. Ibid.

(d) Nebuloſus. 8. I. ſubvilloſus, corpore nigro cinereoque vario. Ibid. *Boſtrichus Fraxini*: ater fuſco cinereoque varius, elytris punctato ſtriatis, antennis teſtaceis clavâ cinereâ acutâ. *Panz. Fn. Inſ. Germ.* Init. n. 66. tab. 13.

(e) Fuſcus. 5. I. fuſcus, antennis pedibuſque teſtaceis; elytris retuſis confertiùs punctulatis. Marſham M. S.

(f) Rhododactylus. 22. I. niger, villoſus totus, plantis rufis. Ibid.

(g) Cylindricus. 6. Pt. ſubcylindricus fuſco ferrugineus; thorace gibbo læviuſculo; antennis pedibuſque rufeſcentibus. Ibid.

 But

But of all the ſpecies of this genus, *Ptinus pertinax* is the moſt miſchievous; any kind of wood that begins to have a tendency to decay, it attacks without mercy. I ſpeak this from experience, having a chamber in my houſe, the floor of which is quite filled and perforated in every direction by this deſtructive little inſect; and my walnut-tree chairs it has nearly reduced to the ſame ſtate that Linnæus obſerves it had done his (*a*).

Amongſt the *Curculiones*, the late ingenious Mr. Curtis has informed us, that *C. Lapathi* feeds upon the willow (*b*). *C. lignarius* (*c*) preys upon the trunk of putrid elms; and *C. atramentarius* (*d*) I have found in all its ſtates in old rails under bark. There is one inſect, which although not as yet diſcovered in England, ought not to be paſſed over, as its hiſtory furniſhes a ſtriking proof how uſeful the ſtudy of Natural Hiſtory may be made when applied to Œconomics: the inſect I allude to is the *Cantharis navalis* of Linnæus. Our preſident, the liberal poſſeſſor of the Linnæan treaſures, informs me, from the *Iter Weſtrogothicum*, that the oak timber in the royal dock-yards in Sweden being obſerved to have ſuffered conſiderable injury from ſome unknown animal, Linnæus was deſired by His Swediſh Majeſty to trace out the cauſe, and point out ſome remedy which might prevent the further progreſs of ſo alarming an evil. Upon inquiry he diſcovered that the miſchief was occaſioned by this *Cantharis*, and he recommended that the timber ſhould be immerſed in water during the uſual time of this inſect's appearance.

(*a*) Terebravit et deſtruxit ſedilia mea. *Linn. Syſt. Nat.*

(*b*) *Linn. Tranſ.* Vol. I. p. 86.

(*c*) *Lignarius.* 113. C. nigro-piceus totus, roſtro craſſiuſculo, thorace punctato, elytris abbreviatis. Marſham M.S.

(*d*) *Atramentarius.* 165. C. ater obovatus, thorace utrinque unidentato, elytris ſtriatis. Ibid.

appearance. This advice was purſued, and the dock-yard timber received no further injury.

We have ſo few ſpecies of the genus *Bupreſtis* in England, and thoſe that we have are ſo ſeldom met with, that it is no wonder if the habitation of their larvæ is not commonly known; both De Geer (*a*), and Geoffroy (*b*), however, are of opinion that they are inhabitants of wood. But the timber-merchant and the builder have no greater enemies than the genuine *Cerambyces*, under which genus I would, with De Geer (*c*), include thoſe only which have reniform or lunar eyes, excluding *C. Curſor*, *Lamed*, *meridianus*, *Inquiſitor*, &c. and taking in *Leptura Alni*, *arcuata*, *arietis*, *myſtica*, *præuſta*, &c. of Linn. Theſe inſects, as far at leaſt as we are acquainted with them, not only devour the ſurface of the wood that lies under the bark, but penetrate deep and in all directions into the ſolid timber. What havock muſt the larva of ſo large an inſect as *Cerambyx coriarius* make in an oak tree (*d*)! I have taken the pupa of *Cerambyx arcuatus* out of the heart of a ſolid piece of the ſame timber, which had been perforated by that inſect in all directions. Once in the height of ſummer, when the mid-day ſun ſhone out warm, I was very much entertained with ſeeing ſeveral of theſe fine inſects fly down upon a pollard oak that had been felled and the bark left upon it, and run all over it with great velocity, ſeeking, it is probable, a place proper for depoſiting their eggs.

Amongſt the *Cerambyces* of this country, the ingenious Mr. Donovan, in his elegant work upon Britiſh Inſects (*e*), has figured *C. vio-*

(*a*) *De Geer*, Tom. iv. p. 131.

(*b*) *Geoffr.* Tom. i. Cucujus. n. 1. p. 125. n. 2. p. 126.

(*c*) *De Geer*, Tom. v. p. 55, 56.

(*d*) Habitat in betulis putridis. *Linn. Syſt. Nat.* But I have known it cut out of an oak.

(*e*) *Donov. Brit. Inſ.* Vol. ii. p. 73. Tab. 61. fig. 1.

laceus,

laceus, and informs us that it probably feeds upon the fir, but at the ſame time expreſſes a ſtrong ſuſpicion that this beautiful inſect is not originally Engliſh. How far this may be true, it is not my intention to inquire; I ſhall only obſerve, that it is now become but too common, at leaſt in one ſpot, in the neighbourhood of London, as will appear from thoſe circumſtances of its hiſtory which I am going to relate.

My friend and relation Mr. James Trimmer of Old Brentford (*a*), an attentive obſerver of nature, more particularly of the economy and habits of inſects, and to whom I am indebted for much curious and intereſting information in this branch of ſcience, ſome time ago wrote to inform me, that he had found this inſect in its three ſtates in fir-timber, and accompanied this intelligence with many ingenious remarks. Expecting him ſoon to viſit me at Barham, in my anſwer I requeſted him to bring with him ſome of its *larvæ* and *pupæ*, and alſo ſome pieces of the wood upon which they had been feeding; at the ſame time I deſired him to continue obſerving their motions. What follows relative to the hiſtory of this *Cerambyx* is chiefly compiled from his communications, which I thought too intereſting to be loſt.

The fir in which Mr. Trimmer firſt found this inſect was of Engliſh growth, of the ſpruce kind, which had not been felled many years, and had originally grown near the ſpot on which the building was erected in which it was employed: it did not appear to have been attacked more than two years when Mr. Trimmer made his obſervations; and it ſuffered moſt in 1798, when the *larvæ* had multiplied ſo much, and been ſo extremely voracious as to have left very little food for another year. Some Scotch fir in an

(*a*) Son of Mrs. Trimmer, ſo juſtly celebrated for her humane and ſucceſsful exertions to procure the great bleſſing of a religious education for the children of the poor.

adjacent

adjacent building had alſo been attacked by them. Nor does this inſect ſo entirely confine itſelf to fir, as never to attack any other kind of wood; for, when the *imago* firſt came forth in conſiderable quantities, Mr. Trimmer took ſeveral and placed them upon ſome pieces of fir which were under cover: but, what ſeems remarkable, the inſects quitted theſe, and went and depoſited their eggs in ſome pieces of apple, pear, cherry and plum, which had been ſelected for turning, and were piled up in the open air.

It is worthy of obſervation, that this deſtructive little animal attacks only ſuch timber as has not been ſtripped of its bark; a circumſtance which ought to be known and attended to by all perſons who have any concern with this article; for the bark is a temptation, not only to the inſect in queſtion, but alſo to a numerous tribe both of this and other genera; and a great deal of the injury which is done to timber would be prevented, if other trees beſides the oak were barked as ſoon as they are felled. The principal danger, however, ariſes from neglecting this precaution with reſpect to ſuch timber as is uſed in buildings, eſpecially in thoſe places that are acceſſible to inſects, for in this caſe it will not laſt out half its time.

But, to proceed with our hiſtory, the female of this inſect is furniſhed with a flat, retractile tube, or rather aculeus (*a*), which ſhe inſerts, it ſhould ſeem, (for Mr. Trimmer was never ſo fortunate as to ſee this operation performed,) between the bark and the wood to the depth of about a quarter of an inch, and there ſhe depoſits her egg, ſince not more than one appears to be laid in one place. By ſtripping off the bark it is eaſy to trace the whole progreſs of the *larva*, from the ſpot where it was newly hatched, to that where it has attained its full ſize (*b*). At firſt it proceeds onwards,

(*a*) Tab. 12. fig. 15. c. (*b*) Fig. 13. a—c.

but

but in a ſerpentine direction, filling the ſpace which it leaves behind it with its excrement, reſembling ſaw-duſt, and ſo ſtopping all ingreſs to enemies from without; but when it has arrived at its utmoſt dimenſions, it does not confine itſelf to one direction, but works in a kind of labyrinth, eating backwards and forwards, which gives the wood under the bark a very irregular ſurface (*a*); by this mean its paths are of conſiderable width. Its attacks are not confined to the ſolid timber, but in its progreſs it eats away an equal portion of the bark. The bed of thoſe paths where it has been at work, exhibits, when cloſely examined, a curious appearance, occaſioned by the eroſions of its maxillæ, which excavate an infinity of little ramified channels. When the inſect is about to aſſume the *pupa*, it bores down obliquely into the ſolid wood, to the depth ſometimes of three inches, ſeldom if ever leſs than two. Theſe holes (*b*) are nearly ſemicylindrical, expreſſing exactly the form of the grub. One would wonder how ſo ſmall and ſeemingly ſo weak an animal could have ſtrength to excavate ſo deep a mine: but when we ſee its maxillæ, our wonder ceaſes; theſe are large, thick, and ſolid ſections of a cone divided longitudinally (*c*), which in the act of maſtication apply to each other the whole of their interior plane ſurface, ſo that they grind the food of the inſect like a pair of millſtones. Early in March all the *larvæ*, except ſome ſickly ones, were obſerved to have entered the wood in this manner; ſome began ſo ſoon as October. At the place in the bark oppoſite to this hole, the *imago* gnaws its way out of its priſon when it makes its appearance, which took place firſt on the 20th of May, and continued till about the 20th of June; it returns by the ſame paſſage which the *larva* had excavated previous to aſſuming the *pupa*.

(*a*) Tab. 12. fig. 14. (*b*) Fig. 14, a a a. (*c*) Fig. 5. b b. Fig. 7. b.

Mr.

Mr. Trimmer thinks that theſe inſects fly only during the night, as in the day-time he always found them ſtanding upon the piece of wood from which they had been diſcloſed. The caſe is different with *Cerambyx arcuatus*, which, as I obſerved before, flies at mid-day: but perhaps this circumſtance may depend much upon the ſtate of the atmoſphere, or the hour of the day; for many inſects have their certain hours for flying; a ſingular inſtance of which I had once an opportunity of witneſſing. In the beginning of July 1793, about ten o'clock in the morning, as I was paſſing through a meadow, I was ſurpriſed with the appearance of what at firſt ſeemed to me to be myriads of bees flying about the hedges and trees; but, upon taking ſome of them, they proved to be *Scarabæus argenteus* (*Melolontha argentea* Fab.); upon my return through the ſame field, a little after noon, I was aſtoniſhed to find that of this infinite hoſt of inſects not a ſingle one was to be ſeen.

I have now communicated all the obſervations which Mr. Trimmer made with reſpect to the hiſtory of this inſect; theſe I hope will not be thought unworthy of the attention of the Linnean Society, ſince they furniſh an uſeful leſſon in Œconomics, and ſupply an additional proof of the utility of the ſtudy of Natural Hiſtory, and to what good purpoſes it may be directed.

Mr. Trimmer, when he came to Barham, brought with him ſpecimens of this inſect in all its ſtates, as alſo ſome pieces of the wood that had been attacked by it, from which I employed my ingenious friend the Rev. Peter Lathbury, F. L. S. to make the drawings which accompany this paper. Nothing now remains but to cloſe this account with a deſcription of each ſtate of the inſect.

CERAMBYX

CERAMBYX.

*****

Thorace inermi subrotundo, s. ex globoso depresso.

violaceus. 70. C. thorace mutico subrotundo pubescente, corpore violaceo, antennis mediocribus. *Linn. Syst. Nat. ed.* 12. *p.* 635. *n.* 70. *Fn. Suec. ed.* 2. *n.* 667. *Vill. Ent. Eur. tom.* 1. *p.* 247. *n.* 71. *Schrank. Enum. Inf. Austr. p.* 147. *n.* 277. *Poda Mus. Græc. p.* 36. *Fn. Frid. n.* 130.

C. violaceus nitens; corpore, thoraceque mutico subrotundo, depressis; femoribus clavatis, antennis mediocribus nigris. *De Geer. tom.* 5. *p.* 88. *n.* 24.

C. thorace subpubescente corpore violaceo antennis brevibus. *Lin. Syst. Nat. Ed. Gmel. p.* 1848. *n.* 70.

Callidium violaceum. *Fab. Ent. Syst. Em. tom.* 1. *par.* 2. *p.* 320. *n.* 9.

Cantharis nigra thorace rotundato, elytris cærulescentibus. *Gadd. Diss.* 28.

Stenocorus violaceus. *Scop. Ann. Hist. Nat. V. p.* 97. 59.

FIGURÆ. *Frisch. Inf.* 12. *tab.* 3. *icon.* 6. *fig.* 1.
Schæff. Ic. tab. 4. *fig.* 13.
Oliv. Inf. 70. *tab.* 7. *fig.* 77.
Herbst. Arch. tab. 26. *fig.* 10.
Ræmer. Gen. Insect. p. 9. *tab. front. fig.* 2.
Donovan. Brit. Inf. vol. 2. *p.* 73. *tab.* 61. *fig.* 1.

LONG. CORP. a lin. $4\frac{2}{3}$ ad lin. $7\frac{1}{2}$.

DESCRIP. *Larva* (*a*) apoda, pallida, plicata, ſubpiloſa, ſupra convexa, ſubtùs planiuſcula, caput versùs incraſſata, ſegmentorum tredecim. *Caput* (*b*) magnum convexum, antennulâ (*c*) triarticulatâ, piloſulâ, utrinque inſtructum. *Os* rufeſcens, labio (*d*) apice rotundato ciliato supernè clauſum: labio inferiori (*e*) trifido, lobis lateralibus palpo unico (*f*), intermedio duobus (*g*), inſtructis. *Maxillæ* (*h*) horizontales, fuſcæ, ſemiconicæ, validiſſimæ, per totam ſuperficiem planam interiorem conniventes.

Pupa (*i*) incompleta, oblonga, pallida; omnes imaginis partes, membranâ tenuiſſimâ tectas, exhibens.

Imago (*k*). *Corpus* piceo-nigrum ſubpiloſum; ſupra violaceum, excavato-punctatum, punctulis creberrimis confluentibus. *Caput* magis exſertum quam in reliquis genuinis Cerambycibus noſtratibus. *Maxillæ* arcuatæ apice conniventes. *Palpi* quatuor capitati, clavâ compreſsâ truncatâ, exterioribus longioribus. *Antennæ* ſubſetaceæ, corpore ſubbreviores, atro-violaceæ piloſulæ, articulis ultimis ſubtomentoſis nigris. *Oculi* lunares baſin antennarum ponè amplexantes. *Gula* nitida. *Thorax* ex globoſo depreſſus, latior quam longus, ſ. lateribus gibbis. *Sternum* violaceum, mucrone brevi inſtructum. *Scutellum* medio depreſſum. *Elytra* linearia vix marginata, e violaceo nitentia ac velut aurata, apice rotundata humeris gibbis. *Alæ* fuſceſcentes; nervis, margineque

(*a*) Tab. 12. fig. 4. (*b*) Fig. 5, b. (*c*) Fig. 5, a a; and fig. 8, b.
(*d*) Fig. 7, a; and fig. 12. (*e*) Fig. 9. (*f*) Fig. 10. h.
(*g*) Fig. 11, a a. (*h*) Fig. 5, b b; fig. 7, b; fig. 8, c.
(*i*) Fig. 2, 3. (*k*) Fig. 1.

margineque craſſiori, nigris. *Abdomen* ſupra planiuſculum, ſubtùs convexum. *Pedes* atri, interdum atro-violacei, femoribus clavatis apophyſi biarticulatâ inſidentibus: tarſi nigri quadriarticulati, unguibus rufeſcentibus.

Variat capite thoraceque vireſcentibus, aliquando ſupra totus vireſcens.

EXPLANATION OF TAB. XII.

FIG. 1. *Imago* of *Cerambyx violaceus*, natural ſize.

2. *Pupa* of ditto, the upper-ſide.

3. —— ditto, the under-ſide, to ſhew the mode in which the antennæ are folded.

4. *Larva* of ditto, a ſmall ſpecimen, and rather ſhrunk for want of food.

5. —— upper ſide of the head magnified. (a a) Its antennulæ. (b b) Its maxillæ.

6. —— the under ſide of the head.

7. —— a portion of the head greatly magnified. (a) The upper lip. (b) Maxilla.

8. —— a longitudinal ſection much magnified, to ſhew the folds of the abdomen more diſtinctly. (a) The head. (b) The antennula. (c) The maxilla.

9. —— under-ſide of the head much magnified, to ſhew the under lip. (a a) Its lateral lobes. (b b) Their feeler. (c) The intermediate lobe. (d d) Its feelers.

10. —— one of the lateral lobes of the under lip exhibited ſeparately, much magnified. (a) Its ſummit rounded and fringed with hair. (b) Its feeler.

FIG. 11. *Larva*—the intermediate lobe of the under lip. (a a) Its feelers.

12. ——- the upper lip much magnified. (a) Its ſummit round and fringed.

13. A portion of the wood with the bark taken off, to ſhow the progreſs of the larva from its being firſt hatched till it begins to work in all directions. (a-c) The ſerpentine path of the inſect. (a) The point where the egg was hatched. (b) The excrement of the inſect preventing all acceſs to it.

14. A portion of wood of irregular ſurface, upon which the larvæ have been long at work. (a a a) Semicylindrical holes where it has bored down into the ſolid wood.—A ſpecimen of this ſent to the Society.

15. Anus of a female, to ſhew the inſtrument by which ſhe is enabled to introduce her eggs between the bark and the wood. (a) The anal ſegment of the abdomen. (b) A flat vagina, into which I ſuppoſe the aculeus is withdrawn when unemployed, and which itſelf is retractile within the anal ſegment. (c) The aculeus flat and bifid at its apex.

XXVII. *De-*

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XXVII. *Defcription of the Vefpertilio plicatus. By Francis Buchannan, M.D. A.L.S.*

Read November 5, 1799.

VESPERTILIO PLICATUS.

Section F of Ker's Tranflation of Gmelin's Syft. Nat.

Tailed; the noftrils round, fimple perforations: the upper lip very large, and folded: the ears as large as the head, folded, and half pendulous.

Inhabits old houfes at Puttahaut in Bengal.

FROM its teeth this bat can only be miftaken for the *Cephalotes*: but the defcription of that fpecies will not apply to this.

From the point of the nofe to the root of the tail 3 inches: from the extremity of one wing to that of the other 12 inches.

The *wings*, and naked parts of the body, are foot-coloured. The hair is mixed with afh-colour, and is paler below than on the back.

The *head* is large, thick at the fhoulders, and tapers gradually to the *fnout*; which is blunt, terminates in a heart-fhaped margin, and projects far beyond the lower jaw. It is moftly naked; but has feveral long, erect briftles. The *noftrils* are fmall circular holes, remote from each other, and placed under the margin of the fnout.

The *upper lip* at the ſides hangs over the under jaw, and at each ſide is deeply wrinkled with ſeven or eight vertical folds. The *ears* are large, blunt, wrinkled, and ſomewhat pendulous. From being bent in ſeveral folds, they at firſt ſight appear to be thick and fleſhy. They approach very near at their inſertion on the brow, and are naked, except on a ſharp ſinus towards the hinder part of the head. On their edge near the tips are five or ſix ſmall warts. There are no internal auricles. The *eyes* are in two ſmall ſlits above the angles of the mouth, and are almoſt covered by the ears. There are two ſtrong *tuſks* in each jaw. In the upper jaw there are two conical ſharp *fore-teeth*, half as long as the tuſks. Below, in place of theſe, there are only two ſmall points, ſcarcely projecting from the gums. The *grinders* are a little removed from the tuſks, and are in each ſide of each jaw five or ſix in number. In the lower jaw each grinder has two ſharp points; in the upper jaw each, except the firſt pair, has three points.

The *neck* is very ſhort, and ſo covered with hair as to be ſcarcely obſervable. The *ſhoulders* are high, and round, with a deep cavity between them. The *body*, at the ſhoulders, is much wider than at the haunches. The *buttocks* are bare.

The *tail* is naked, round, and blunt: it is turned up at the end. A ſtrong hooked *claw* in place of the thumb. No carpus nor metacarpus. Four long *fingers* ſerve to diſtend the membrane of the wing. The *hind-feet* have five diſtinct toes, with ſmall ſharp claws. The *membrane* of the *wings* joins the hinder legs and tail, but it is not nearly ſo long as the latter. A broad *hairy liſt* ſurrounds all round the body, and covers the bottom of the membrane.

The drawing and deſcription was taken from a male. I could obſerve no nipples.

The

Vespertilio plicatus.

The natives of Bengal have only two names for all the fpecies of bats found in their country. The large bats, which neftle on trees, and live chiefly on fruit, they call Bādŭr: thofe which, like the one above defcribed, inhabit caverns and old buildings, and live chiefly on infects, they call Chamchēēka.

TAB. XIII. reprefents the *Vefpertilio plicatus* of its natural fize.

XXVIII. *Descriptions of five new British Species of Carex.* By *James Edward Smith, M.D. F.R.S. P.L.S.*

Read December 3, 1799.

AFTER fo copious a harveft of Britifh Carices as that with which my learned friend Dr. Goodenough has enriched the fecond and third volumes of our Tranfactions, no great acquifitions of the fame kind are to be expected. The gleanings only of this ample and well-cultivated field, fo lately an impenetrable wildernefs, have fallen to my lot; and though but about the tithe of the crop, I have fpared no pains to collect and methodize them. The value of fuch difcoveries increafes in proportion to what we have already obtained; and I am very well aware how much I am indebted, for their perfpicuity and certainty, to the clue my predeceffor had left me.

In labouring at the genus *Carex* for the Flora Britannica, I have, as in every other inftance, examined the fubject throughout, without taking any thing for granted; but in no tribe of equal intricacy have I found fo little at prefent to correct. What I am now about to offer is chiefly the defcription of 5 fpecies, in addition to the 47 defcribed by Dr. Goodenough. For the difcovery of thefe I am entirely obliged to the friends whofe names will hereafter appear. I have only to anfwer for the fpecific determination of 4 of them. Of the preceding 47 fpecies the *Carex axillaris* only has not come fo completely under my examination as I could have wifhed, though

though I have found no reason to doubt its being sufficiently different from all others. *C. fulva* appears, notwithstanding Dr. Goodenough's correction, *Trans. of Linn. Soc. v.* 3. 77, to be very distinct from *flava*, having longer vaginæ (which however are shorter than the flower-stalks), oval spikes, the fruits erect, not recurved, and a rough stem. Its habit too differs, approaching towards that of *C. distans*; but its glumes being perfectly awnless, keep it from being confounded with any variety of the last-mentioned. In my arrangement of the species I have taken the liberty of making some alterations, disposing them according to their natural affinities, rather than their technical characters. In the generic character I have adopted an alteration lately suggested to me by Dr. Goodenough himself, calling the permanent husk that invests the seed an *arillus*, a name which I cannot help thinking expresses its true nature much better than the hypothetical one of *nectarium*, the erroneous one of *capsula*, or even the analogical denomination of *corolla*. The generic character will therefore stand as follows:

Masc. *Amentum* imbricatum. *Cal.* gluma univalvis. *Cor.* nulla.
Fœm. *Ament.* imbricatum. *Cal.* gluma univalvis. *Cor.* nulla. *Stigmata* 2 vel 3. *Semen* arillo ventricoso tectum.

My new species belong to the first, third, and fourth sections of the genus.

* *Spicâ unicâ simplici.*

1. CAREX *Davalliana.*

Prickly separate-headed Carex.

C. spicâ simplici dioicâ, fructibus lanceolato-triquetris nervosis patenti-deflexis: angulis apice scabris.
Carex dioica. *Wilden. Car. Berol.* 16, ex descr.
C. n. 1350. *Hall. Hist. v.* 2. 182.
Gramen cyperoides, spicâ simplici cassâ. *Scheuchz. Agr.* 497. *t.* 11. *f.* 9, 10; synonymis omninò erroneis.

In uliginosis. *Fl. Maio, Junio.*
Discovered in marshy ground in Mearns-shire, North Britain, by Professor James Beattie jun. of Aberdeen.

Radix fibrosa, cæspitosa. *Culmi* simplicissimi, triquetri, scabriusculi, quandoque scaberrimi, monostachyi, basi foliosi, parùm altiores quam in C. dioicâ verâ. *Folia* setacea, triquetra, culmo triplò breviora. *Spicæ* dioicæ, lineares, erectæ, multifloræ, vix unciales, glumis fuscis, carinatis, acutis, margine scariosis. *Stamina* capillaria, exserta, antheris flavis, linearibus. *Fructus* lanceolato-triquetri, nec gibbi, rostrati, undique nervosi, angulis apice scabris, ore scarioso, integro, demùm deflexo-patentes, acuminati, unde spicæ seminiferæ squarrosæ fiunt.

Specimens of this Carex were sent to me from Switzerland, as well as to Dr. Goodenough, (see his postscript at the end of our 2d volume,) by my much lamented friend the late Mr. Davall, who

 discovered

difcovered it to be different from the Linnæan *dioica*, to which the fynonym of Scheuchzer is referred in the *Species Plantarum*. Linnæus, however, has erafed this quotation from his own copy of that work. Mr. Davall has affured me this plant is very common in almoft every damp fpot about Orbe; whereas he had met with the *dioica* only in one peat bog. I have no doubt of its being what Haller intended under his n. 1350; it agrees exactly with his defcription, though he has confounded under it fynonyms of *dioica* and *pulicaris* at leaft, if of no more fpecies. It appears to be the *dioica* defcribed by Profeffor Wildenow in his recent treatife on the Carices found about Berlin, printed in the Tranfactions of the Academy of that place. Scheuchzer erroneoufly applied to it fynonyms of Ray which belong to *C. pulicaris*, and has by that means been the caufe of fubfequent miftakes. Mr. Davall having firft elucidated the fubject, I have confecrated the fpecific name to his memory.

No one had fufpected this to be a Britifh plant till I received a fpecimen this autumn from Profeffor Beattie of Aberdeen, under the name of *dioica*, along with a rich affemblage of great part of the whole genus.

C. Davalliana is readily and effentially diftinguifhed from *C. dioica* by the fruit being of a triangular-lanceolate, not ovate, form, reflexed, not erect, and alfo much more ftrongly nerved. No one who has examined both can ever confound them. *C. pulicaris* is diftinguifhed by being always androgynous, and having fruit altogether without nerves, lanceolate, and pointed at each end.

*** *Spicis sexu distinctis: masculâ unicâ, rariùs geminâ: bracteis foliaceis et plerumque vaginantibus.*

2. CAREX *binervis.*

Green-ribbed Carex.

C. vaginis elongatis pedunculo brevioribus, spicis cylindricis remotis subcompositis, glumis mucronulatis, fructibus binervibus.
Carex distans. *Lightf.* 561, ex descr.

In ericetis ficcioribus. Fl. Junio.
Very common on the driest moors about Aberdeen. *Prof. Beattie.* Near Edinburgh. *Mr. J. Mackay.*

Radix fibrosa. *Culmus* erectus, firmus, sesquipedalis, bipedalis, vel tripedalis, obtusè triqueter, lævis, apicem versùs hinc scaber. *Folia* erecta, latiuscula, acuminata, glaucescentia, marginibus carinâque aspera. *Bracteæ* foliis simillimæ, elongatæ, erectæ, longiùs vaginatæ, remotæ. *Spica* mascula utrinque attenuata, sæpè sesquiuncialis, multiflora, glumis densissimè imbricatis, ellipticis, obtusis, submucronulatis, nigricantibus, carinâ acutâ, virenti; fœmineæ tres aut quatuor, rarissimè quinque, sparsæ, cylindricæ, erectæ, inferiores remotissimæ, longiùs pedunculatæ, atque sæpiùs basi compositæ seu ramosæ, quandoque omnes supernè masculæ. *Glumæ* fœminearum ovatæ, nigræ, mucronulatæ, carinâ virenti, glabrâ, mucronulo scabro. *Fructus* glumis longiores, ovati, vix rostrati, glabri, nitidi; intùs apiceque sanguineo-fusci; extùs pallidi, nervis duobus lateralibus viridibus præcipuè conspicuis. *Semen* acutè triquetrum, albidum.

This

This fpecies appears to have been confounded with *C. diftans*; and from Lightfoot's defcription of the green angles of the fruit, I prefume it to have been what he intended under that name. It is confiderably larger than the real *diftans*, the fpikes black intermixed with green rather than yellowifh, and the female ones often branched or compounded at their bafe. Its moft effential and decifive character however confifts in the two ftrong deep-green nerves or ribs which run along each fide of the fruit externally near the edge. The arillus is alfo broader and more compreffed than in *C. diftans*.

3. Carex *tomentofa*.

Downy-fruited Carex.

C. vaginis breviffimis, fpicis fœmineis fubfeffilibus cylindraceis obtufis, glumis ellipticis acutis, fructibus tomentofis.

Carex tomentofa. *Linn. Mant.* 123. *Leers.* 200. *t.* 15. *f.* 7. *Wilden. Car. Berol.* 24. *Dickf. Dr. Pl.* 43.

In pratis rariùs. Fl. Junio.
In meadows near Merfton Meafey, Wiltfhire. *Mr. Teefdale.*

Radix repens. *Culmus* pedalis, erectus, nudus, acutè triqueter, angulis fupernè fcabris. *Folia* culmo breviora, erecta, plana, lætè viridia, utrinque margineque fcabra. *Bracteæ* foliaceæ, erecto-patentes, culmum vix fuperantes, vaginâ breviffimâ, aut ferè nullâ. *Spica* mafcula lanceolata, obtufiufcula, glumis lanceolatis, ferrugineo-fufcis, carinâ virenti, fuperioribus quandoque mucronulatis; fœmineæ plerumque duæ, parùm remotæ, breviffimè pedunculatæ, cylindraceæ, obtufæ, longitudine variæ, glumis elliptico-ovatis,

vix

vix mucronulatis, ferrugineo-fuſcis, carinâ latè virenti. *Fructus* longitudine circitèr glumarum, densè imbricati, ſubrotundi, parùm compreſſi, vix triquetri, virides, tomento denſiſſimo, brevi, albido, demùm aureo, undique veſtiti. *Semen* albidum, obſoletè triquetrum.

Dr. Goodenough has ſhown that the *C. tomentoſa* of Lightfoot and Hudſon is the *filiformis* of Linnæus. I have now the pleaſure of giving the real *tomentoſa* a place in the *Flora Britannica*, on the authority of wild ſpecimens gathered in Wiltſhire laſt ſummer, by my friend Mr. Teeſdale, F. L. S. Thoſe in Mr. Dickſon's *Dried Plants*, *n.* 43, were all ſent from Switzerland. It is moſt akin to *præcox* and *pilulifera*, (both which have the fruit in ſome degree pubeſcent,) but is a much larger ſpecies, and if the ſpecific character be attended to, cannot be confounded with any other. The red *vaginæ* of the radical leaves, as in *C. digitata*, are very ſtriking at firſt ſight.

**** *Spicis ſexu diſtinctis: maſculis pluribus.*

4. CAREX *Micheliana.*

Blunt-fruited Black Carex.

C. ſpicis erectis cylindricis: fœmineis pedunculatis, glumis omnibus obtuſis muticis, fructibus obovatis obtuſiſſimis.

Cyperoides foliis caryophylleis, caule exquiſitè triangulari, ſpicis habitioribus, ſquamis curtis obtusè mucronatis, capſulis turbinatis brevibus confertis. *Mich. Gen.* 62. *t.* 32. *f.* 12.

In aquoſis. Fl. Maio?
Near Aberdeen. *Prof. Beattie.*

Culmus

Culmus erectus, pedalis aut sesquipedalis, triqueter, striatus, vix scaber. *Folia* erecta, acuminata, marginibus aspera, carinâ leviusculâ. *Bracteæ* foliaceæ, erectæ, culmum superantes, haud vaginatæ, basi auriculatæ, auriculis magnis, rotundatis, connatis, fuscis, apice pallidis. *Spicæ* cylindricæ, obtusiusculæ, erectæ; masculæ tres aut quatuor, subsessiles, graciles, glumis obtusissimis, muticis, glauco-fuscis, margine tenui, scarioso, niveo; fœmineæ duæ, longiùs pedunculatæ, crassiores, superior apice mascula, inferior basi interdùm composita, glumis ellipticis, obtusissimis, muticis, fuscis, margine scarioso, albo, carinâ flavescente, obtusâ. *Stigmata* tria. *Fructus* glumis multò breviores, obovato-triquetri, dilatati, ferè enerves, glabri, virescentes, apice obtusissimi, indivisi. *Semen* triquetrum, breve, fuscum, angulis pallidis.

I cannot but confess that it was with extraordinary pleasure I detected a specimen of this Carex among many supposed varieties of *recurva* communicated by Professor Beattie; for I immediately perceived its striking agreement with that long-doubtful figure of Micheli, *tab.* 32. *f.* 12, which has been sometimes referred to *acuta*, sometimes to *stricta*, and hitherto found to agree well with no known species. As I believe no one but Micheli has described or distinguished this plant, I have given it his name. His definition above-quoted will be found precisely to accord with it, and I trust my specific character and description will prevent its being mistaken in future. It is most allied to *C. recurva*, (which sometimes varies with numerous male spikes,) but the perfectly smooth fruit, shorter than the glumes, and rather compressed, by no means gibbous, clearly distinguishes *C. Micheliana*; not to mention its greater size, and erect female spikes, the lowermost of which is liable to be branched at the base, as in *C. binervis*.

5. CAREX

5. CAREX *lævigata.*

Smooth-stalked Beaked Carex.

C. spicis cylindricis: fœmineis pedunculatis, vaginis longissimis, glumis acuminatis, fructibus triquetris rostratis bifurcis.

In paludibus. Fl. Maio.
In a marsh near Glasgow, 1793. *Mr. J. Mackay.* Marshes near Aberdeen. *Professor Beattie.*

Radix fibrosa. *Culmus* erectus, 2—4-pedalis, triqueter, lævis, infernè foliosus. *Folia* erecta, latiuscula, lætè viridia, lævia, longissimè vaginata; superiora margine aspera. *Bracteæ* foliaceæ, erectæ, culmum superantes, acuminatæ, acumine aspero, vaginis longissimis, pedunculo tamen brevioribus, supremis quandoque brevissimis et ferè nullis. *Spicæ* cylindraceæ, elongatæ, acutæ, graciles, erectæ; masculæ sæpiùs duæ, glumis lanceolatis acutis, frequentiùs mucronulatis; fœmineæ duæ vel tres, longissimè pedunculatæ, pedunculis capillaribus, læviusculis, glumis lanceolatis, mucronulatis, ferrugineis, dorso viridibus, mucrone scabro. *Stigmata* tria. *Fructus* glumis longiores, lanceolato-triquetri, erecto-patentes, nervosi, haud inflati, virides, glabri, in rostrum attenuati compressum, apice profundè bifurcum. *Semen* fructum implens, triquetrum, breve, fuscum, pedicellatum.

I cannot refer this to any species already described. For some time I was in danger of confounding it with *C. vesicaria* in a young state, but the repeated admonitions of Mr. Mackay warned me. Having examined it in various states, I have no doubt remaining.

Its

Its long *vaginæ*, and the fruit being not inflated but filled with the large ſeed, diſtinguiſh it from *veſicaria* and *ampullacea.* It agrees in many particulars with *ſylvatica* and *ſtrigoſa*, but differs in having more than one male ſpike, as well as much thicker and denſer female ones.

I know of no figure of this ſpecies, nor of *C. binervis*; but as I hope to procure freſh ſpecimens for publication in *Engliſh Botany*, I decline offering any delineation of dried ones. A figure of a Carex, in order to be uſeful, ſhould exhibit the fructification in various ſtates, and expreſs particularly the form, ſurface, and nerves of the *arillus*, and the ſhape of the ſeed.

XXIX. *Additional Note to the Remarks on the Nature and Propagation of Marine Plants,* p. 145.

By Lieutenant Col. Thomas Velley, F. L. S.

Read December 3d, 1799.

Colonel Velley wiſhes to explain a paſſage that poſſibly may be ſubject to miſconſtruction in his paper, p. 154. It is there obſerved that the central ſubſtance in *Fucus ſerratus* is never converted into mucilage. His meaning is, that it does not diſſolve, as in *F. veſiculoſus*, leaving the pericarps enveloped in a filamentous ſubſtance. The *F. ſerratus* certainly produces a mucilage in its ſummit, as well as in every other part of its frond at certain periods; and from the indiſcriminate ſituation of this fluid, an argument may ariſe againſt its peculiar reference to the faculty of impregnation, which is confined merely to the ſummit of the plant.

XXX. *Additional Note to the Obſervations on the Britiſh Species of Mentha, p. 171.*

By James Edward Smith, M.D. F.R.S. P.L.S.

Read December 3d, 1799.

ON cultivating a root of Mr. Sole's *Mentha pratenſis*, ſent by himſelf, I have found it turn out exactly my *rubra*; and indeed, on an accurate re-examination of his original dried ſpecimen, I find no reaſon to doubt its being truly the *rubra*. To this ſpecies therefore I would wiſh to refer it inſtead of *gracilis*; ſee p. 210 of the preſent volume.

Since the printing of this paper I have met with freſh reaſons for believing the *Mentha ſativa* and all its varieties to form one ſpecies with the *hirſuta*; and in the Flora Britannica, now in the preſs, I have accordingly united them.

XXXI. Extracts *from the* Minute Book *of the Linnean Society.*

April 3, 1798. AN account of the *Ardea Gardeni, Gmel. Syst. Nat.* v. 1. 645, having been shot in Oxfordshire by John Horatio Dickinson, Esq. F.L.S. was communicated to the Society.

Nov. 6. The Rev. Mr. Abbot, F.L.S. informed the Society of his having taken the *Papilio Paniscus (Hesperia Paniscus,* Fab.) in Clapham-Park Wood, Bedfordshire. He observes that " this *Papilio* is most easily taken in May and " June, when the *P. Lucina*, or Duke of Burgundy Fritillary, " is out; but the term of its existence seems to be longer, " as some specimens have been caught, in good condition, " a full fortnight after the *Lucina* has disappeared. It is " to be found from 7 to 9 o'clock in the morning; very " often playing in pairs just after sun-rise, or at least as " soon as the morning fog has evaporated. Its flight is " extremely short, very near the ground. It delights to " settle on the blades of very long Grasses or *Carices*, and " is far from being a timid insect." Mr. Abbot wishes to name it the Duke of York Fritillary. With its *larva* and *pupa* he is unacquainted.

CATA-

CATALOGUE

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END OF THE FIFTH VOLUME.

Printed by J. Davis, Chancery Lane.

ERRATA in VOL. IV.

Page 172, line 4 from the bottom, *before* "peculiar" *inſert* "any."
176, line 6, *for* "uropæi" *read* "Europæi."
178, line 15 and 16, *for* "ſuperiùs" *and* "inferiùs" *read* "ſuperius" *and* "inferius." The ſame errors again occur p. 180 and 183.
180, line 20, &c. *read thus* "foliolis nunc bifidis, laciniis anguſtiſſimis æqualibus; nunc lanceolatis, integris, vel uno latere inciſis."
209, line 6, *for* "ſon" *read* "ſon'."
229, line 25, *for* "in what darkneſs we were before" *read* "where we were in darkneſs before."
231, line 20, *for* "exuvia" *read* "exuviæ."
232, line 17, *for* "linearis" *read* "linearem."
line penult. *for* "to" *read* "into."
235, Note, line 3 from the bottom, *for* "felicitates" *read* "felicitatis."
line penult. *for* "pulchredine" *read* "pulchritudine."
251, line 8, *for* "extended" *read* "extend."
256, line 3 from the bottom, *inſtead of the* ſemicolon *put a* comma, *and for* "for" *read* "as."
258, line 23, *for* "having, beſides ſomething ſimilar to it," *read* "have ſomething ſimilar to it, namely."
265, line 4 from the bottom, *for* "accuminatæ *read* "acuminatæ."
269, line 16, *for* "ſaturatæ" *read* "ſaturate."

Tab. 19. No. IV. Fig. I. The feeler to which the letter *a* was intended to refer is not engraved.
22. Pauſus microcephalus.
Fig. 4. The dotted lines (*b*) ſhould have been drawn to the tops of the lower joints; and the dotted lines (*f.f*) ſhould have been drawn farther into the jugular triangle.
Fig. 5. For "*b*" read "*c*," and for "*c*" read "*b*."
For "michrocephalus" *read* "microcephalus."
Pauſus Sphærocerus.
Fig. 3. For "*b*" read "*d*," and for "*d*" read "*b*."
Fig. 6. For "*b*" read "*c*," and for "*c*" read "*b*."
For "ſparocerus" *read* "ſphærocerus."

VOL. V.

Page 4, line 21, the words "*aperturæ margini reflexâ*" are improperly printed in italics.
9, line 4, *for* "iſſued" *read* "iſſue."
12, line 18, *after* "dilated" *inſert* a comma.
19, lines 25 and 26, *for* "the boat" *read* "a boat."
33, line 1, *read* "baſe of the upper mandible," &c.
149, line 26, *for* "directs" *read* "direct."
151, line 2, *for* "poſition" *read* "ſtructure."

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